INDIA RUBBER WORLD
FOUNDED 1889
CAOUTCHOUC
GUTTA-PERCHA

Reg. United States Pat. Off. Reg. United Kingdom.

Published on the 1st of each month by

THE INDIA RUBBER PUBLISHING CO.

No. 25 West 45th Street, New York.

Telephone—Bryant 2576.

CABLE ADDRESS: IRWORLD, NEW YORK.

HENRY C. PEARSON, Editor

Vol. 55 MARCH 1, 1917 No. 6

SUBSCRIPTIONS: $3.00 per year, $1.75 for six months, postpaid, for the United States and dependencies and Mexico. To the Dominion of Canada and all other countries, $3.50 (or equivalent funds) per year, postpaid.

ADVERTISING: Rates will be made known on application.

REMITTANCES: Should always be made by bank draft or Postoffice or Express money order on New York, payable to THE INDIA RUBBER PUBLISHING COMPANY. Remittances for foreign subscriptions should be sent by International Postal Order, payable as above.

DISCONTINUANCES: Yearly orders for subscriptions and advertising are regarded as permanent, and after the first twelve months they will be discontinued only at the request of the subscriber or advertiser. Bills are rendered promptly at the beginning of each period, and thereby our patrons have due notice of continuance.

Entered at the New York postoffice as mail matter of the second class.

TABLE OF CONTENTS ON LAST PAGE OF READING.

RUBBER AND SUBMARINE WARFARE.

THE declaration by Germany of a submarine blockade of the British Isles has become not only a serious menace to the commerce of the world but a matter of peculiar interest and concern to the American rubber industry.

As the financial and commercial center of the world, London has been generally regarded as the world's great rubber market, and will probably continue to be as long as the bulk of plantation rubber is grown on British soil, even though Germany should temporarily succeed in isolating the United Kingdom from the rest of the world. Since the outbreak of the war, however, New York has been rapidly measuring up to London as a commercial center. Its increasing importance as a rubber market is indicated by the fact that of our total 1916 rubber imports amounting to approximately 115,609 tons, or about 65 per cent of the world's production, not far from 70 per cent came through the port of New York. Only 25,647 tons, or a little over 22 per cent, came by way of England, and the balance of approximately 89,962 tons, representing our direct rubber imports, were 20 per cent greater than the total rubber imports of the United Kingdom for 1916, amounting to about 75,240 tons. Therefore, the ordinary London stocks on hand, averaging about 10,000 tons, do not figure to any considerable extent in the American supply, and double normal and even greater cargo rates, together with recent increases in war risk insurance of 125 to 900 per cent, will tend still further to encourage direct rubber shipments to New York via the Panama Canal and to augment greatly the noticeably growing imports at Pacific Coast ports, through which nearly 30 per cent of our 1916 supply came.

While the submarine blockade is primarily one of British waters it has brought about a virtual tie-up of all transatlantic shipping of neutral nationality in American ports, and a long continuance of this situation cannot but result in a far reaching disturbance of the industrial life of the United States. Indeed, on February 15 it became necessary for 30 railroads to declare an embargo on export shipments through eastern ports until the vast accumulation awaiting sailings can be taken care of. From the standpoint of the rubber industry, therefore, exports are more seriously affected than imports, the situation in respect to raw materials being better than in certain other lines of manufacturing. There may be a temporary shortage in New York crude rubber stocks with consequent speculation and upward price fluctuations, but the dull January market indicated that most manufacturers have sufficient supplies on hand to tide them over this period. Our principal crude rubber supply routes still remain unaffected, but a considerable part of our exports of manufactured rubber goods, which amounted to nearly $35,000,000 for the year 1916, are seriously menaced.

The policy of the United States in this commercial crisis has not been determined, and what England as mistress of the seas can do to alter the situation remains to be seen. At the time of writing the program to isolate her completely by submarine destruction of shipping at the rate of a million tons a month has fallen far short of fulfilment. Reported sinkings to date have not averaged half that. British officials express the belief that through the capture of undersea craft, convoy of merchant vessels and the establishment of strongly guarded ocean shipping lanes the British navy will have the submarine menace well in hand within two months and do not anticipate being obliged to resort to the cargo submarine in a struggle for existence. Unless the past rate is exceeded it will take approximately 3½ years to destroy the present British merchant marine totaling about 15,850,000 tons, and every British shipyard is running to full capacity day and night replacing lost tonnage. Since the outbreak of the war this has amounted to 4,000,000 tons, of which 3,000,000 tons is said to have been more or less adequately replaced.

SAVING AND RECOVERING SOLVENTS.

At the close of the first instalment of his article on rubber solvents, elsewhere in this issue, Lothar E. Weber, Ph. D., touches upon the timely and pregnant subject of profitable solvent recovery, pointing out several of its advantages, difficulties and essentials. The prevailing high prices of gasolene and naphtha have stimulated interest to a remarkable degree of late in devices for both saving and recovery, and inquiries regarding processes and apparatus are of frequent occurrence.

The initial move in saving is at the storage plant, where tanks, pipes and faucets should be as tight as possible. Vessels used to carry the solvent should always have covers. More important, however, is that muddlers and mixers of all sorts should be closed when a batch is being put into solution. When finished it should be drained off into covered cans.

In ordinary spreading the solvent is evaporated as soon as possible, and lost. The beginning of solvent recovery is an exhaust hood hung over the spreader that collects the naphtha fumes. These are then easily condensed by chilling, and drawn off for further utilization.

Most of the solvent recovery mechanisms are either German or English in origin, and were designed for the great proofing establishments abroad. The Weber-Frankenburg, Vincent, Heinzerling and Spendle are the best known. While differing in many details, they do the work in much the same way. In a word, the fabric, as soon as it is proofed, enters a closed chamber, heat volatilizes the solvent, which is carried against cold surfaces, condensing it. Dripping from these surfaces, it is collected in tanks, often in water, drawn off and stored for re-use.

The whole apparatus is simple and one that any chemical engineer can construct without difficulty.

Of course, the idealist is just now to the fore with plans to do away with solvents in rubber work; to spread by heat only, and, carrying the thought further, to heat the tops of makeup tables, use hot rollers for rolling, hot stitchers for stitching, etc. But as far as extensive accomplishment goes that is all in the future.

THE HOUSING OF EMPLOYES.

One of the greatest progressive industrial movements of the day is the comfortable housing of employes by their employers. The general prosperity of the country has made it possible, indeed imperative, because the refining influences of shorter working hours, better wages and superior education have brought about a higher standard of living which calls for expression chiefly in the home. It is a noble movement for any great firm to identify itself with, and therefore a pleasure to state that the rubber and allied industries are well represented; also that the end is not yet.

But lest those who know little of it assume the enterprise to be purely philanthropic, its practical side should be emphasized. To live like a good citizen is to become one, and those firms who have made it possible for every operative to do so agree that benefiting the employe likewise benefits the employer. All report a better individual tone, an increased and improved mill production, a marked tendency toward permanency of employment, and a larger spirit of coöperation between the operative and the mill management.

These highly desirable results are achieved at virtually no ultimate expense to the firm, for it has been found that most men desire to own their homes and are willing to pay for them when an easy-payment plan within their means presents itself. A large firm erecting many cottages can build attractively and well for less money than the individual can build poorly. The financial standing, credit, expert advice and greater purchasing power of the employer insure minimum expense and afford the employe the opportunity to enjoy his house while paying for it. Meanwhile the firm gets legal interest on the investment and reaps many cumulative benefits besides. As contrasted with disorganized individual effort, building many houses along the lines of maximum standardization in design, adaptability to the application of the most economic methods of construction and coördination of the process of shop manufacture effect such further economies in cost as even to make possible permanent fireproof construction in certain localities.

In view of the manifest importance of this subject the series of articles setting forth what has already been accomplished by the rubber and allied industries, which begins on another page of this issue, is of timely interest in anticipation of further spring building operations. These articles are by John Barnard, a Boston architect who has studied the better housing of employes from its inception in England several years ago; who has visited Port Sunlight, Bourneville, Hampstead and other model British garden villages, and who has a thorough grasp of this industrial problem of the day and the means to solve it.

BRITISH RUBBER ASSOCIATIONS.

That the welfare of the British rubber trade will be closely guarded from now on and particularly after the war is suggested by the associations now in existence. They are The Rubber Growers' Association, Inc., The British Rubber Tyre Manufacturers' Association, Limited, The Rubber Trade Association of London, The British Rubber Shoe Manufacturers Association, The Balata Belt Manufacturers' Association, all of London; and The India Rubber Manufacturers' Association, Limited, of Manchester.

The Nature and Uses of Rubber Solvents—I.

By Lothar E. Weber, Ph.D.

[In the second installment of this article Dr. Weber will discuss benzol, solvent naphtha, shale oil, carbon bisulphide and carbon tetrachloride.]

IT is only in one or two specialized branches of the rubber industry that solvents play an integral part in the process of manufacture. On the other hand, the large majority of rubber articles require the services of a solvent in some part of their manufacture, or at least for some component part entering into their manufacture. The function of the solvent in the latter case may seem to be an unimportant one, but the manufacturer would be sorely pressed without its aid. The importance of the solvent is realized more vividly when for any one of a number of reasons it becomes a source of defective goods. It can be said that just as a chain is no stronger than its weakest link, so is a rubber article no stronger than its cement. Accordingly, the question of solvents is an important one for the rubber industry and the rubber manufacturer.

While the number of liquids which have the property of dissolving rubber is numerous, relatively few of them find commercial application in rubber manufacture. The origin of these latter it is proposed briefly to describe, as well as their use in the rubber industry, the specifications which they should meet, and the defects caused by failure to meet these specifications.

GASOLENE.

In this country the solvent which finds the most extensive application in the rubber industry is gasolene. This material is a product of crude petroleum, in which it is present to the extent of from 10 to 15 per cent, depending on the origin of the petroleum in question. By means of distillation crude petroleum can be separated into various "fractions," one of the most important of which is gasolene.

Unfortunately gasolene is not a homogeneous substance, but a complex mixture. Not only do the actual materials constituting it vary, but their relative amounts show wide fluctuations, while still permitting the product to be sold and bought as gasolene. These constituent substances are known chemically as hydrocarbons (that is, substances composed of carbon and hydrogen), and more specifically as paraffin hydrocarbons.

These constituting members of gasolene have a very close chemical relationship to each other. By way of analogy, they may be compared to a sectional bookcase, in that the latter is composed essentially of a base and one or more units. Just so these paraffin hydrocarbons are composed of their basic substance, added to which, is a varying number of units or increments. Naturally a hydrocarbon composed of the basic substance and, let us say 6 increments, differs in properties from a hydrocarbon composed of the basic substance and 7 increments. We can look upon gasolene as a mixture of hydrocarbons, each hydrocarbon being composed of the basic substance and a varying number of increments.

Since the components of gasolene may show such variation, some specific designation is necessary for the purpose of characterization. Unfortunately specific gravity has been chosen for this purpose, as in the early days of the petroleum industry it was soon recognized that the more volatile portions of the crude oil had a lower gravity, in fact that a relationship existed between volatility and gravity. It therefore became customary to sell gasolene on a gravity basis, the Baumé gravity scale being generally employed.* That this gravity designation has still survived is very much to be regretted.

(* According to the Baumé scale for liquids lighter than water, the reading increases with decreasing gravity. That is to say, 75-degree Baumé corresponds to a lighter gravity than does 60-degree Baumé.)

In the majority of cases it is the volatility of the gasolene which determines its desirability. In order, then, that the designation of the gasolene may be significant, there should be a direct relationship between the gravity and volatility. While this was to a large extent true in the early days of the petroleum industry, when crude oil had only relatively few sources of origin, it no longer holds true to-day. It is a matter of common observation that during recent years the volatility of gasolene has been continually decreasing with little or no change in the gravity. To be sure, in the case of motor gasolene there have been changes in both the volatility and gravity, but the 60-degree gasolene of to-day is much less volatile than the material sold under the same name three or four years ago.

The more accurate and significant method of designating gasolene is by reference to its boiling points. If gasolene were a homogeneous liquid composed of only one hydrocarbon, it would have a definite boiling point just as water has a definite boiling point of 212 degrees. As has already been pointed out, however, gasolene is not a homogeneous substance but consists of a mixture of closely related hydrocarbons. As these hydrocarbons boil at different temperatures, the mixture obviously cannot show a constant boiling point. It is for this reason that we find that whereas an average sample of gasolene begins to boil around 140 degrees F., a temperature of well over 300 degrees F. is necessary before all the gasolene will boil. There being a very close relationship between volatility and boiling point, by knowing the temperatures at which definite volumes of gasolene boil, one is in a position to compare accurately the volatility of one gasolene with another.

For the sake of clarity, there are tabulated below the boiling points of a few samples of gasolene taken at random:

	A	*B*	*C*	*D*
5 per cent boils under..	194 deg. F.	162 deg. F.	118 deg. F.	145 deg. F.
10 per cent boils under..	197 deg. F.	176 deg. F.	133 deg. F.	147 deg. F.
30 per cent boils under..	212 deg. F.	223 deg. F.	154 deg. F.	165 deg. F.
50 per cent boils under..	221 deg. F.	252 deg. F.	180 deg. F.	192 deg. F.
70 per cent boils under..	244 deg. F.	286 deg. F.	206 deg. F.	221 deg. F.
90 per cent boils under..	289 deg. F.	343 deg. F.	244 deg. F.	302 deg. F.
95 per cent boils under..	314 deg. F.	365 deg. F.	262 deg. F.	329 deg. F.
Specific Gravity	61 deg. Be.	60 deg. Be.	71 deg. Be.	72 deg. Be.

A represents a motor gasolene purchased in 1911.
B represents a motor gasolene of recent date.
C represents a 71-72-degree Baumé gasolene purchased in 1911.
D represents a 71-72-degree Baumé gasolene of recent date.

Comparing samples *A* and *B*, it will be observed that while the gravity of the two gasolenes is practically identical, there is a wide difference in their boiling points. Similar facts are observed on comparing samples *C* and *D*, which are of practically identical gravity. It is therefore evident that the designation of a gasolene by its gravity gives little indication as to its boiling points, and hence, as to its volatility. It would be much to the benefit of the rubber manufacturer if gasolenes could be bought or even offered on a boiling point basis. It would be sufficient merely to state the temperatures at which say 5, 50 and 95 per cent of the material boils in order to give the purchaser a general idea regarding its nature.

The three major uses of gasolene in the rubber industry are in (1) Spreading, (2) Dipped goods, (3) Cements. It may therefore be of interest to refer to the requirements which are demanded of the gasolene in each of these three applications.

SPREADING. For spreading purposes it is not desirable to have a gasolene showing extreme boiling points. That is to say, low initial points and high final points are undesirable. On the whole, sample *A* is a satisfactory gasolene for spreading, but

it would be preferable if 95 per cent of it boiled under 300 degrees F. rather than under 314 degrees F. Sample *B* is much less desirable, chiefly on account of the high final boiling point. The initial boiling point is a little lower than in the case of *A*, but scarcely sufficient to have it react to its disfavor. Sample *C* is considerably too low in boiling points for advantageous use in spreading. Sample *D* is much less desirable than sample *A*, for the reason that its extremes show wider fluctuations. For spreading purposes, it is undesirable to have the initial boiling points much under 160 degrees F., for the reason that if such is the case, large losses of gasolene are apt to take place while the rubber compound is being churned and also while the churned mass lies in the spreading room prior to use. The majority of the material boiling below 160 degrees F. is lost before the rubber dough reaches the spreading machine. An even more serious objection is the fact that these low boiling portions are not only non-solvents for rubber, but actually inhibit the dissolving action which the higher boiling portions exercise. The result is that these low boiling fractions, when present, actually tend to decrease the solvent power of gasolene.

On the other hand, if the gasolene contains an excessive amount of high boiling material, it is difficult to drive off the last traces on the spreading machine. The result is that the latter are retained by the coating and as a result of being subsequently vaporized by the higher heat of vulcanization become the most fruitful cause of what is known as "pin holes." To be sure, it is possible to overcome the danger of "pin holes" even when a gasolene is used containing much high boiling material, but not without seriously impairing the output of the spreading machine.

DIPPED GOODS. Since the evaporation of the gasolene used in dipped goods has to be accomplished without the aid of heat, comparatively high volatility is required. As in the case of spreading work, initial low boiling points are undesirable in that they inhibit the dissolving power of the gasolene and for the further reason, that they tend to produce blisters. If the nature of the gasolene is such that it evaporates too quickly, the outside surface of the cement dries, with the formation of a film, enclosing some gasolene underneath it. In the course of time this gasolene will tend to vaporize, and as the pressure of the latter becomes sufficient to rupture the outer "film," a blister results. On the other hand, if the boiling points are too high, blisters will also occur, as some gasolene will be retained. When the dipped articles are then subjected to the slightly elevated temperatures of the acid cure, the retained gasolene will be vaporized, again with the formation of blisters. A composite sample of *C* and *D* would be the most desirable; that is, a sample having the initial boiling points of *D* and the end boiling points of *C*.

CEMENTS. The gasolene requirements for a cement are essentially ease of volatility, and what is closely related thereto, complete vaporization of the solvent. Any residue greatly impairs the adhesive qualities of the cement and also its lasting qualities. Boiling points similar to those desirable for dipped goods will generally be found satisfactory.

The price of gasolene having steadily risen owing to the enormous increased demand, it is natural that attempts should be made for the purpose of obtaining substitutes for gasolene or at least of converting less valuable petroleum products into material having essentially the same properties. While it has not yet been possible to find such a substitute, two products are known which are used quite extensively in admixture with gasolene. The two materials in question are: (1) casing-head gasolene and (2) cracked gasolene.

CASING-HEAD GASOLENE. The source of this material is natural gas, from which it is obtained either by compression or else by so-called "washing" with oils of high boiling point. Casing-head gasolene is an exceedingly volatile material and for this reason comes on the market only in admixture with inferior grades of gasolene. It is used primarily as a "sweetener," that is to say, for decreasing the boiling points of gasolene which would otherwise be unsatisfactory owing to excessively high boiling points. From the standpoint of the rubber manufacturer the addition of casing-head gasolene is undesirable, for the reason that the resulting mixed gasolene shows low initial boiling points and high end boiling points. As has been pointed out above, the rubber manufacturer is interested in a gasolene having relatively narrow extremes of boiling points. Even though the boiling points of the mixed casing-head gasolene show these variations, by suitable manipulation of the mixture the gravity is such as to give no indication of the presence of a mixture. This again shows the fallacy and undesirability, from the rubber manufacturer's standpoint, of estimating the value of gasolene purely on a gravity consideration.

CRACKED GASOLENE. The cracking of petroleum oils is a relatively old art, but it is only within recent years that special attention has been given to this process. Cracked gasolene is obtained usually from kerosene or fuel oil, and consists in subjecting either of the latter to high temperature and pressure. By means of the cracking process the high-boiling petroleum hydrocarbons are converted into hydrocarbons of much lower boiling points; so much so, that a large proportion of the material resulting from the cracking process boils within the limits of the average gasolene. However, a wide variety of substances are formed in this operation, some of which have markedly different properties than the paraffin hydrocarbons which constitute gasolene as we know it. Cracked gasolene is especially rich in a group of substances known as "olefines." These olefines are very undesirable from the standpoint of motor gasolene and are largely responsible for the so-called "carbon" deposits in the cylinders. This is one of the reasons why cracked gasolene comes on the market only in the form of an admixture with natural gasolene, and then only mixed in relatively small proportions. From the standpoint of the rubber manufacturer it is rather doubtful if these olefines are a detriment, except for the fact that their boiling points are relatively low. To be sure, if gasolene which contains much cracked material is allowed to lie in the tank for an extended period, the olefines have a tendency to go over into a thick viscous oil which settles at the bottom. However, in most rubber factories the gasolene does not have a chance to be stored sufficiently long, prior to use, to enable the formation of this heavy oil to take place.

SOLVENT RECOVERY. Many attempts have been made to recover or partially recover the gasolene used in certain branches of the rubber industry, notably in the spreading operation. The volume of gasolene in a spreading plant vaporized in the course of a month's operation reaches staggering figures and it is only natural that the recovery of the solvent should have been given serious thought. While theoretically the recovery of gasolene from the spreading operation is a simple matter, the practical difficulties and cost of equipment have so far stood in the way of its applicability. In this connection it is not generally recognized that even if all the gasolene which is vaporized in the spreading room were successfully condensed, the resulting material would have properties differing materially from those of the original gasolene. Owing to the relatively low initial boiling points of gasolene, considerable losses take place during the churning operation; so much so, that if only the gasolene which is vaporized in the spreading room were condensed, its boiling points would be very much higher than those of the original gasolene. The recovery process, in order to make it complete, would have to be extended to the churn room. It can readily be seen, therefore, that the size and cost of equipment of such a complete recovery plant would be high. Nevertheless, there is every reason to expect that a recovery plant would be a good investment if the purely mechanical and engineering difficulties are solved.

COTTON READY FOR SHIPMENT AT CALEXICO, IMPERIAL VALLEY, CALIFORNIA.

Long-Staple American Cotton by Irrigation.

A MIRACLE is being performed in that part of the United States known as "the great Southwest," which promises soon to become the principal American source of long-staple cotton. Irrigation has provided the key to successful agriculture in Arizona, southern California and northern Mexico, where hundreds of thousands of acres of arid lands and great stretches of the Colorado Desert, on which only sagebrush, cactus and the pallid Spanish dagger formerly grew, are being transformed into one of the most bountifully productive regions of America. Grains, fruits, nuts, alfalfa, sugar cane, garden truck and live stock have in the past been looked upon as the chief products of irrigation, but the tremendous cotton yields of the past year indicate that this important crop may soon take precedence over all others. Weavers of higher-grade fabrics who are striving to meet the growing demands of rubber tire and other manufacturers are focusing their attention upon this remarkable development in the belief that an adequate supply of long-staple cotton grown within our borders will soon be assured. A few leading tire concerns are manifesting even more direct interest, one having contracted with a planter in Imperial Valley, California, to take annually for five years the entire crop from 5,000 acres of new land, and the other being about to plant 1,000 acres of cotton in Salt River Valley, Arizona, to insure its supply of tire fabric.

Although the United States provides considerably more than half the world's cotton production (57.4 per cent in 1915) and exports a tremendous quantity annually (6,191,110 bales for the year ending July 31, 1916, or more than half the year's ginnings) it does not grow an adequate supply of long-staple cotton to meet the American demand for thread, knit goods, lace, tire and other higher-grade fabrics requiring great strength. Of the 420,995 bales of foreign cotton imported during the fiscal year 1916, statistics show that 350,796 were long-staple Egyptian. At least half of this was used in the manufacture of tire fabrics, for it should be noticed that considerably less than 1 per cent of the total 1915 American cotton crop of 11,191,820 bales was of the Sea Island variety. With slight prospect of any considerable increase in this percentage it is not surprising that the phenomenal growth of the cotton planting industry in California since 1909 should set tire manufacturers and fabric weavers to thinking.

Tires average about 5 pounds of fabric each, and as it is estimated that the 1917 tire production will reach 25,000,000, about 125,000,000 pounds of fabric, equivalent to over 250,000 bales of long-staple cotton, will be required to meet this demand alone. 350,000 acres planted to Durango or Egyptian cotton in the Southwest and scientifically cultivated would render the American tire industry independent of imports, and this is only a little over one-third of the unimproved land in Imperial Valley alone that can be irrigated by the available water supply, which can be even further increased by the building of reservoirs.

The outstanding fact which has awakened the tire industry to its great opportunity is the 1916 crop of Imperial Valley cotton, grown entirely by irrigation and amounting to 70,000 bales—equivalent to 76 per cent of the 1915 Sea Island total of 91,844 bales, 5,824 of which were exported. Not all of this was long-staple, though it might have been, for the Durango variety thrives there and is said by experts to be equal in quality to the choicest Sea Island and better than much of the Egyptian cotton now offered to the trade.

From approximately 100,000 acres on both sides of the international boundary, about 45,000 acres in the United States and 55,000 in Mexico, the 1916 crop reached the record total of 40,000 short-staple bales of big boll mebane, averaging 18 cents a pound, and 30,000 long-staple Durango bales averaging 24 cents. Some of the former brought as high as 19 cents, and of the latter as high as 28 cents, so that the value of the total cotton yield of Imperial Valley is estimated at $7,500,000 to $8,000,000, making this the premier crop of what is becoming the richest agricultural community in California.

As it costs an average of 9 cents per pound to produce short-staple cotton and 12 cents to grow, pick, haul and gin the long-staple, the planter who sold at 18 cents and 24 cents respectively, as many did, doubled his investment at the rate of $45 and $60 per bale, to which may be added $15 to $20 per bale for the seed. This profit of $60 to $80 per bale, the prospect of growing a bale or better per acre, together with an ever-growing demand at record prices are the inducements that will probably double the cotton acreage of Imperial Valley in 1917.

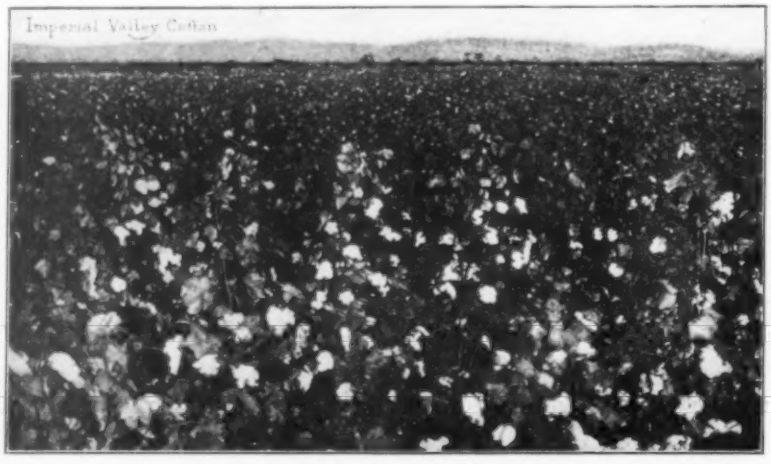
Despite the prospect of enormous cotton acreages throughout the South next year, 95 per cent of this will be short-staple so that record crops will not depress the high prices obtainable for the California product, because the demand for long-staple will still be in excess of the probable supply. Buyers who are trying to contract forward for Imperial Valley short-staple cotton at 17 cents and long-staple at 23 cents are finding few takers, for the planters realize that the present surplus on hand is smaller than at any time within the past decade, and that with increased consumption and a short crop in other growing countries, the end of the war, should it occur, would immediately open up greater markets abroad. Should the war continue, they also know that American munition manufacturers consumed 900,000 bales during the year 1916, exclusive of heavy exports to Canadian, British and French factories.

With the entire question of cotton as one of the permanent and most important farm industries of southern California apparently settled for good and all, Los Angeles, as a great cotton market of the near future, promises to take its place beside the great cotton ports of the South, and to outstrip Savannah, Brunswick, Pensacola and Charleston as a shipping point for long-staple cotton. Its railway connections and fine harbor provide the shipping facilities to send cotton textiles all over the country, the western hemisphere and even around the world, and already local capitalists of vision are beginning to discuss a project to erect large yarn and weaving mills. A growing conviction is being manifested that cotton goods and by-products for consumption west of the Rocky Mountains should be manufactured in California.

It is well to mention the matter of by-products, for time was when the old-fashioned planter had to burn the seed and stalks to get rid of them. Now, through the ingenuity of man and his modern machinery there is no waste whatever, and cottonseed products are numerous, varied and valuable. Linters, oil, cake and hulls all have their uses. Even cotton stalks are employed in the manufacture of fiber, paper, carpets and vegetable ivory or cellulose.

From the long-staple cotton going to make up a bale, about 1,200 pounds of seed are extracted, and from short staple the yield is only a little less, so that Imperial Valley ranchmen last year received in the neighborhood of $1,250,000 for seed alone. At the beginning of the cotton season in September the three oil mills in the valley began paying $20 a ton for cottonseed, but because of improved shipping facilities raised the price to $30, and toward the close of the year to $40.

Of the immediate products of expressing the oil from the seed, the linters are used for absorbent cotton and in the manufacture of high explosives. The oil makes excellent soap, is widely used in cooking as a substitute for lard, and when refined often replaces olive oil for the making of salads. The hulls are in demand for feed and the cake for both feed and fertilizer. Cotton hulls make an excellent fattening food for cattle, while cottonseed meal, obtained by grinding the cake, is not only fattening but when fed to sheep is said to produce 15 to 20 per cent more than the normal growth of wool. The five states of Utah, Montana, Oregon, Idaho and Washington will consume all the cottonseed meal and hulls the Imperial Valley can produce for years to come, thus in a sense turning cotton into wool. For winter feeding the cake is made into balls about the size of an English walnut for scattering over the snow.



COTTON FIELD IN THE IMPERIAL VALLEY.

Thus this great new agricultural industry is becoming of keen interest to labor as well as capital. Already it has provided an exceptional opportunity for unskilled workers. Shortage of cotton pickers at the beginning of the season threatened disaster, but the County Farm Bureau soon had the problem well in hand with laborers coming from all parts of southern California, Texas and Oklahoma. The fact that the plants would not rust nor mildew on account of the absence of rain and fog made it possible to extend the picking season considerably and so helped mightily in solving the labor problem. Los Angeles bootblacks and even women have been making the wages of building mechanics in the cotton fields. The rate paid ranged from $1.00 to $1.25 and even $1.50 per 100 pounds, depending on the stand, and ginning averaged $4.50 per bale.

The raising of cotton in this the largest irrigated cotton area in the United States has many advantages. Government crop reports show that the yield is high and that the staple has length, strength and uniformity; characteristics which are very desirable, and due, in part, to the absence of periods of drought or of excessive rains. Government statistics also show that the average yield per acre in Imperial Valley was 400 to 500 pounds, or approximately one bale, whereas the average in the entire country was only 170 pounds. The reasons for this greater yield are the warm climate, rich silt soil, the ability to apply water whenever needed, freedom from pests and longer growing season.

Because of this latter fact, instead of one crop, Imperial Valley cotton plants produce two, or more correctly, a series of crops. Cotton takes very little from the soil, and a simple system of occasional crop rotation or fertilizing enables one to carry on a plantation indefinitely. As Department of Agriculture officials credit Imperial Valley with the highest priced short-staple cotton, averaging 16 to 18 cents against 11.3 cents for the entire country, it is not surprising that tracts are known to have paid the full cost of the land plus the cost of irrigating, planting, cultivating, picking and marketing in one season and still netted a profit of $25 an acre.

On many well-worn plantations in Georgia and Alabama pickers consider themselves doing well to get half a bale of short-fiber cotton to the acre a season, while several tracts under irrigation in the Imperial Valley are on record as having produced two bales of long-staple cotton to the acre and two crops a year which has brought as high as 28 cents a pound, and this on land that cost less than $100 an acre, water rights included.

Cotton has been grown in this locality on a commercial basis for only a few years. There were 5,986 equivalent 500-pound bales ginned in 1910, 9,790 in 1911, 8,215 in 1912, 22,838 in 1913, 49,835 in 1914, and 28,551 in 1915. According to the estimates of the Department of Agriculture, the cotton area in 1916 was 98,000 acres, or about double the average in cultivation the previous year.

The statistics above include cotton grown in Mexico (Lower California) and brought into this country to be ginned. The same conditions of soil and climate are found in the Mexican portion of Imperial Valley as in the American, while the cost of cultivating and picking is less because of the availability of Chinese labor. According to official reports, the quantity of unginned cotton imported into the customs district of southern California from Mexico during the year ending July 31, 1915, produced about 21,000 bales of lint.

Some fields below the boundary line yield enormously, several growers obtaining a bale and a half to two bales to the acre. One grower who leased 1,600 acres at $10 an acre raised 2,000 bales of fine quality short-staple cotton and sold it for $160,000. His profits in a single season were about $75,000. From the same field a cotton stalk was cut in October that had more than 300 fully matured bolls. Rules for estimating yields are that 65 matured short-staple bolls will make a pound of cotton, and that land when planted in rows three and a half feet apart and the plants two feet apart will yield one bale to the acre if the plants average forty bolls. An acre of plants such as was cut from this Lower California field would produce more than 7 bales.

The development of Imperial Valley, due to irrigation, has been phenomenal. Fifteen years ago the census could have been taken on the fingers of one hand. To-day it has increased to over 50,000 and the thriving towns of Calexico, El Centro, Im-

perial, Brawley, Holtville, Seeley, and Calipatria take a just pride in their fine churches, schools, libraries and community institutions. About 500,000 acres are in cultivation—approximately 100,000 acres each in cotton, alfalfa, and barley, besides immense tracts devoted to fruits and vegetables and the raising of over 200,000 head of cattle, sheep, horses, mules and hogs—and the yearly agricultural production considerably exceeds $25,000,000. Land values vary from $65 to $150 an acre according to proximity to towns and the assessed property valuation is not far from $90,000,000, yet the county tax rate steadily decreased to $1.90 in 1914.

According to a recent report of the chief engineer of the Imperial Irrigation District, 1,400,000 acres may be irrigated from the Colorado River. Of this vast area, 700,000 acres are in Imperial Valley proper, 500,000 acres in the delta of the Colorado and 200,000 acres in Sonora, Mexico, below the Yuma Valley. Thus no less than 900,000 acres of irrigable land still remain undeveloped—an area that would render the nation independent of long-staple cotton imports for many years to come.

Without the need of a dam, the water for the Imperial Valley irrigation system is diverted from the Colorado River through a concrete head gate about 12 miles below Yuma, Arizona, and 4 miles above the Mexican line. The main canal carries the water through the natural channel of the Alamo River to headings whence distributing canals divert it again to the various farms. The main channel was originally owned by the California Development Co., but during the past year the people of Imperial Valley organized the Imperial Irrigation District and bonded it for $3,500,000 to purchase the irrigation system. As present canal facilities embrace about 574,000 acres, the bonded debt is only about $6.10 per acre. The average cost of irrigation water throughout the valley is about $3.50 per acre a year, varying somewhat with the character of the soil and the nature of the crop.

Most of the cotton grown in the Salt River Valley, of Arizona, has the same characteristics as the cotton grown in Egypt, having been propagated from seed brought from that country. It is grown on irrigated land and the average yield is high, especially where the soil has been improved by alfalfa and beneficial river sediments. Arizona's production for the past four years has been 2,229 bales in 1913, 7,142 bales in 1914, 1,981 bales in 1915 and about 4,000 bales in 1916. The falling off in 1915 was due to smaller planted acreage on account of low cotton prices at that time. But with approximately 7,000 acres planted in 1916 and both demand and prices promising for some time to come, the permanent establishment of the Egyptian cotton industry in that state seems assured.

Including the Roosevelt Dam, the government has expended over $10,000,000 on the Salt River project for the benefit of the people in the intensive cultivation of 219,000 acres of land where climate, soil and water are virtually ideal. The present cost of water for three acre feet, the usual amount required, is only $1.50 a year, and it is expected that within a few years it will be delivered practically free because of the sale of surplus water outide the project area. There will also be a revenue of $1,000,000 from 27,000 electric horse power, 10,000 of which, yielding $400,000 annually, is already being consumed by mining concerns.

There are no government lands in the Salt River Valley. Every acre is in private hands and the acreage of rentable lands obtainable on lease is comparatively small, but land prices are still reasonable and terms of payment convenient. As the area of the project is limited, however, title to every irrigable acre promises to be steadily on the increase. Improved land that is being farmed costs $100 to $200 per acre, while lands for cotton are still obtainable at $100 to $125 per acre. Yields per acre have not equaled Imperial Valley, but they are far above the average and with scientific cultivation should reach a bale per acre.

LONG-STAPLE COTTON IN 1915-16.

IN addition to the wealth of statistics and other information characteristic of previous reports of this nature, Bulletin 134, recently issued by the Department of Commerce, Bureau of the Census, entitled "Cotton Production and Distribution, Season of 1915-16," contains considerable information of interest to manufacturers of automobile tire fabrics. Several quotations selected from various sections of the bulletin have been pieced into the following continuous narrative:

The limited supply of cotton having a long staple, and the world-wide demand for cotton of this character in the manufacture of thread and the higher grade fabrics, and recently of automobile tires, have given such varieties an importance seemingly out of proportion to the amount produced. While at one time long-fiber Sea Island cotton grown in the West Indies provided a large part of the total used in Europe, the world's production of this variety at the present time is comparatively insignificant, averaging less than 100,000 bales per annum. The quantity of long-fiber cotton produced in Egypt last year was less than a million bales, and the quantity of upland cotton with a staple of 1⅛ inches or more in length produced in the United States from the crop of 1915, according to the estimate of the Department of Agriculture was about 825,000 bales. Long staple cotton is also produced in comparatively small quantities in India, Brazil, Peru, and several other countries. Altogether the total of long staple cotton—that is, cotton having a fiber of 1⅛ inches or more in length—produced throughout the world from the crop of 1915 did not, in all probability, exceed 2,000,000 bales.

The 1915 crop of Sea Island cotton is given as 91,844 running bales divided as follows: Georgia, 57,572; Florida, 28,094; South Carolina, 6,178. Of this total 5,824 bales were exported. The 1916 exports, however, were only 3,580 bales.

It might be presumed that the prices generally received for Sea Island cotton would cause a large increase in the acreage, but attempts to grow it in other parts of Georgia, Florida, South Carolina and other states have been so unsatisfactory that practically all efforts to raise it outside of certain well-defined areas in the states named above have been abandoned.

Of the total consumption of cotton in the United States during the year ending July 31, 1916, amounting to 6,397,613 running bales, 82,645 were Sea Island and 316,995 foreign. A very large proportion of the foreign cotton consumed was Egyptian; imports of Egyptian cotton by American manufacturers have led to efforts to grow in the United States cotton having its characteristics, and some encouragement has been given the movement by the success attending its culture in Arizona.

The status of the cultivation of Egyptian varieties of cotton in this country is presented in the following statement, prepared by the Department of Agriculture:

The abnormally low prices of 1914 caused a greatly diminished acreage to be planted to Egyptian cotton in Arizona in 1915. The total production last year amounted to only about 1,100 bales of 500 pounds each. This small crop sold at a much better price than in 1914, and consequently the acreage planted in 1916 increased to about 7,000 acres. A crop of about 4,000 bales is anticipated this year. The improvement in methods of production which is taking place as the farmers of Salt River Valley become better acquainted with this crop will probably result in larger average yields per acre than have previously been obtained. * * * In view of the strong demand for the type of cotton (Sakellarides) with which the Arizona product is most nearly in competition, the prospects for the permanent establishment of the Egyptian cotton industry in that state are better than ever.

EMBARGO ON YARNS FROM SEA ISLAND COTTON.

On February 23 the British Cotton Export Committee issued a notification to the Manchester Chamber of Commerce announcing that it will not in the future recommend the issue of licenses for the export of cotton yarns made from Sea Island cotton.

The Manufacture of Klingerit Steam Packing.

THE advent of high steam pressures created a demand for packing of special composition that would withstand the extremely high temperature and unusual steam pressures resulting from this radical change in steam engineering. The ordinary rubber sheet packing was characteristically unfitted to resist steam pressures of 180 pounds and temperatures varying from 180 to 185 degrees C. A reliable heat resisting steam packing was therefore a prime necessity and German ingenuity promptly attacked the problem of evolving a new packing material. A composition consisting of asbestos, rubber and certain mineral fillers, such as china clay, barytes, infusorial earth and hydro-cellulose was found to be very satisfactory. The rubber content, however, was comparatively small, as its province in this instance is principally that of a cement.

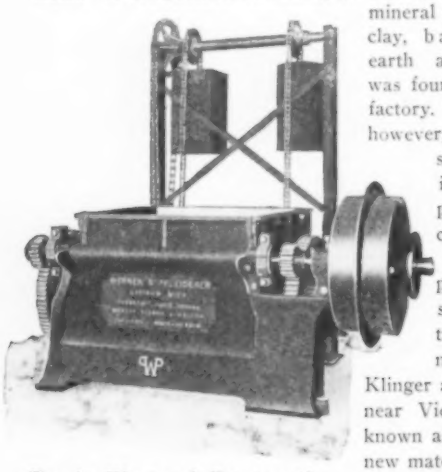


FIG. 1.—WERNER & PFLEIDERER'S MIXER.

The first compressed asbestos sheet packing offered to the trade was manufactured by R. Klinger at Gumpoldskirchen near Vienna, Austria, and known as "Klingerit." This new material was successful almost from the start and the large demand that soon followed grew in volume until it became worldwide. It was not long before aggressive competition appeared and similar compositions were manufactured and sold under the trade names, Moorit, Mezelerit, and Cooperit. The name "Itplatte" was subsequently protected by Gustav Adolph, of Biebrich, Wiesbaden, Germany.

The United States' trade in asbestos sheet packing that rapidly grew to large proportions was for the greater part monopolized by the German manufacturers who were able to undersell their competitors in this country. Since the war has effectively closed this source of supply the demand has been supplied by American manufacturers, and the following brief description of machines used in the manufacture of Klingerit will therefore be of interest.

The crude asbestos is first treated in a machine of the type known as a Chili mill, which separates the impurities and felts the fibers together. The asbestos material is then passed through a carding machine provided with a belt conveyor that carries away the carded fiber in the form of a light fluff. The preparation of the rubber is in no way different from that of making ordinary cement, the washed and dried rubber being placed in a power driven churn and sufficient benzine or naphtha added to make a thin solution. The compounding ingredients consisting of heavy calcined magnesia, oxide of iron and sulphur are then added to the rubber solution and the whole is thoroughly mixed for about 2 hours in a Werner and Pfleiderer enclosed mixer shown in Figure 1. Finally the carded asbestos fiber is slowly fed into the same machine and worked up with the other materials into a homogeneous mass.

The sheets are then built up on the Hauboldt mill shown in Figure 2. This machine is designed on the principle that a comparatively small roll operating against one of large diameter, and both revolving at equal surface speed, will exert a greater pressure on the material than two rolls of the same diameter.

This machine has very heavy frames *A* and *B* supporting the rolls *C* and *D*, that are operated by double faced spur gears *E* and *F*, the circumference of the large roller determining the length of the sheet. The small roll *C* is adjustable and driven from the main driving shaft by the large spur gear *G*. The counterweights *H*, *H* hold a stripping knife against the surface of the small roll to keep it smooth and clean. The large roll *D* is hollow and provided with steam and water connections for heating and cooling purposes, while movable gages determine the width of the sheet.

In operation, the small pressure roll is adjusted to the desired thickness of the sheet and the warm dough is evenly applied to the large roll in convenient sized balls or chunks in a manner similar to that used in calendering. A very thin sheet is thus formed on the large roll in the form of a jacket which after being rolled down to size is coated with a special rubber solution containing the distinctive coloring matter. Dough is again applied to the large roll and the second sheet rolled down on the first one and solutioned. This operation is repeated until the desired thickness has been attained, when the built-up sheet is cut transversely and removed from the roll.

Sheets up to 6½ feet wide, 9¼ feet long and about ⅛ inch thick may be made on this machine.

The solvent recovery apparatus shown in Figure 3, consists of a water-cooled casing surrounding the rolls and provided with an opening of sufficient size to permit material being fed to the machine. A spray of water from pipes located inside of the casing creates a downward circulation of air and naphtha vapor

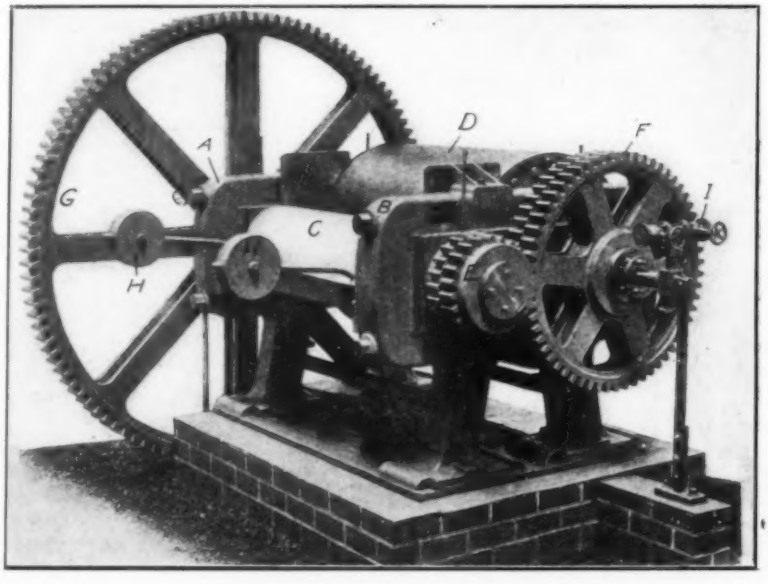


FIG. 2.—HAUBOLDT'S ITPLATE MILL.

which is condensed and flows on the water through the connecting pipe to a receptacle on the right where the condensed solvent is separated and drawn off.

The finishing operation of standard sheets consists in applying a cover coating of a colored rubber solution to both sides of the sheets and passing them between the rolls of a two-roll

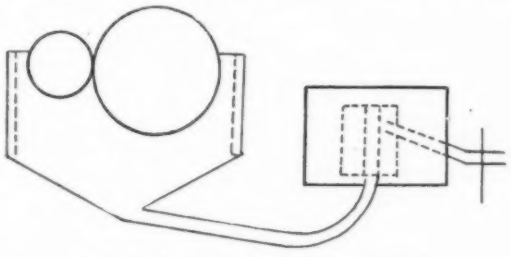


FIG. 3.—SOLVENT RECOVERY APPARATUS.

vertical calender. Klingerit boards of different gage are made on the same machine by doubling sheets of predetermined thickness.

It frequently occurs that the sheets made on the rolling machine or calender are spotted with dark stains or imperfectly laminated. The machine shown in Figue 4 was therefore designed and found very satisfactory in turning out perfectly finished boards.

It comprises two solid side frames supporting between them a heavy bed-plate or table on which the sheets are placed. A heavy polished, chilled iron roller is journaled in a movable carriage that traverses the table in both directions, driven by a reversible lead screw, the movement of which is controlled by straight and crossed belt-driven pulleys. A sheet is placed on the table and the weighted roller is passed back and forward over the surface several times. It is then turned in a horizontal plane and the rolling continued, after which the sheet is reversed and the other side treated in the same manner.

Standard Klingerit boards are 3.75 millimeters (about 1/8 inch) in thickness, being built up with 15 thin layers that are .25 millimeters thick. They are blue, reddish-brown, or green in color and the dimensions are as follows:

Millimeters.	Equivalent Inches.
2000 x 2000	78.7 x 78.7
2500 x 2500	98.4 x 98.4
2000 x 3000	87.7 x 118
3000 x 3000	118 x 118
1250 x 4000	49.2 x 157.4
1600 x 6200	62.9 x 244

"It" material is made only in unvulcanized sheets from which the various shaped packings are cut or stamped, the contained rubber being vulcanized after the joint has been made by the heat of the steam. For special purposes metal gauze or tin-foil is placed between the sheets or they may be coated with graphite, the object being to prevent vulcanization. Attention is particu-

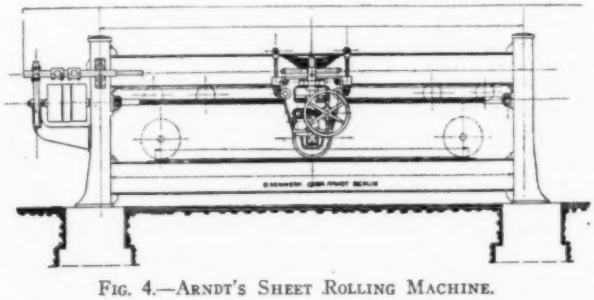


FIG. 4.—ARNDT'S SHEET ROLLING MACHINE.

larly called to the fact that Klingerit packings should be kept in a cool dry place, otherwise they will become hard and lose their flexibility.

NEW USES OF SPONGE RUBBER.

BECAUSE of its cellular structure, sponge rubber has several very peculiar properties. For example, it has the lowest apparent specific gravity of all solid bodies, being around 0.05. In spite of its cellular structure it is water-tight, and very nearly gas-tight. While it is honeycombed with minute cells, each cell is an individual unit and the rate of diffusion of gases through it is comparatively low. Because of its low specific gravity it has a very low specific volume, which thus brings its cost within range for common purposes. Perhaps one of the most important uses to which it has been put is in the preparation of life preservers. It will not waterlog, is light, conforms easily to the lines of the body, and is not to be ruined by a pin prick. A life raft made with sponge rubber is as near fool-proof as one can be. Buoys, markers, etc., may be improved by its use.

For some time the brains and time of many men have been occupied in a search for a substitute or modification of the pneumatic tire for automobiles. We have seen about everything, from metal springs to tires made with the regular tire casing but containing a solid block of gum used as a bumper. The season of tire fillers occupies now only a page in the history of this search. Springs have been discarded because of their slowness to respond, and it has been decided by the great majority of automobile owners that nothing rides as easy as air, and rather than use tire fillers they would substitute solid tires.

Two serious objections to most tire fillers are that under constant running they tend to heat up, and finally to decompose, and, second, there is quite a tendency to form flat spots.

As has been mentioned, the most satisfactory tire filler to date is air. This air is customarily held in an inner tube under moderate pressure. It is now proposed to use sponge rubber molded to fit the inside of the tire casing, and in this manner produce a puncture-proof tire. The car still rides on air, but this air is confined in innumerable little sacks. The conditions necessary for a satisfactory tire filler are as follows:

1. It must be quite stable and so constructed that fatigue is reduced to a minimum. 2. It must be light. 3. The driving power must be transmitted elastically. Sponge rubber fulfills all these conditions. Tires filled with this material were driven 1,950 miles, with an average speed of 35 miles per hour, without any deterioration of the filler.

As would be expected, the cellular nature of sponge gives it great insulating properties, both in respect to heat and sound. It is proposed to use the material for the construction of sound-proof rooms, telephone booths, under musical instruments, and under vibrating and hammering machines, etc. It is proposed also for clothing for aeronauts and arctic explorers.

So far we have spoken only of soft sponge rubber. Hard sponge rubber is also available. It is prepared from soft sponge by further vulcanization. It is understood that the soft sponge is secured by properly regulating the time and temperature of the cure. The stock is made up with sufficient sulphur to effect the transformation to ebonite, so that after producing soft rubber further vulcanization takes it over to hard sponge.

This material has an apparent specific gravity of 0.2 to 0.065, which is ½ to 1/6 that of cork, and ¼ to 1/12 that of wood. It may be worked in any way customary with hard rubber, such as sawing, boring, machining, etc. It still has the cellular structure of soft sponge, and therefore its insulating properties are not in the least affected. However, it is now not so susceptible to temperature change, and will stand temperatures up to 130 degrees C. It is recommended for icebox walls, covering for flasks, and other insulation problems.

Hard sponge has considerable strength, and has been proposed as a material for the framework of aeroplanes. It has also been recommended as a material for constructing automobile bodies. [Andrew H. King in "Metallurgical and Chemical Engineering."]

TIRE FILLERS AND PUNCTURE FLUIDS.

THE use of tire fillers is not generally encouraged by rubber manufacturers. They contend that a tire casing filled with a substance possessing a "rubber-like resiliency" is virtually a solid tire and would better be made wholly of rubber.

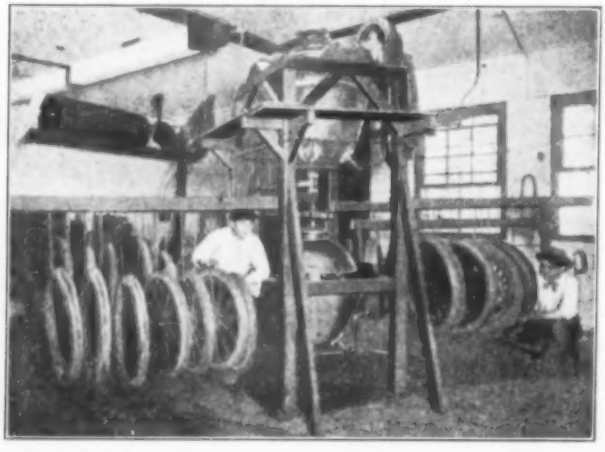
Puncture fluids are also discouraged as being an evasion of the well-known fact that the most effective medium for repairing rubber is rubber itself. Moreover, the reclaiming of tires containing puncture fluids is troublesome and expensive.

The European war, however, has created unusual conditions that demand continuous and exceedingly severe tire service until both casings and tubes are entirely worn out. At the front both the Allies and the Central Powers are using tire fillers through obvious necessity rather than choice. For this reason the following brief review of the representative types of fillers and puncture fluids is timely.

Tire fillers are of three kinds. The first is a liquid to be injected into the tire, where it subsequently solidifies, forming a cushion substitute for air. The second consists of porous rubber compound molded in sections conforming in size and shape to the casing in which it is to be inserted. The third is a viscous puncture fluid that flows over and coats the inner surface of the tube.

A tire filler of the first type consists of a heavy fluid which is either forced directly into the casing or pumped into the inner tube through the valve, where it soon solidifies into a resilient, rubber-like body. "Rubberine" belongs to this first class and is a semi-fluid filler, to be pumped directly into the casing, which it distends to the required pressure according to the weight of the car and then solidifies into an elastic body. Inner tubes are thus dispensed with and the tire requires no more attention until thin or completely worn out. This is an English preparation which is being used with considerable success in military service where the ordinary tire has proved undependable under extreme road stress and gun fire.

"Newmastic" is of American origin and representative of that class of fillers which are pumped into and completely fill the inner tube at the proper operating pressure. With this filler the casings should be new, but old inner tubes may be used. Should



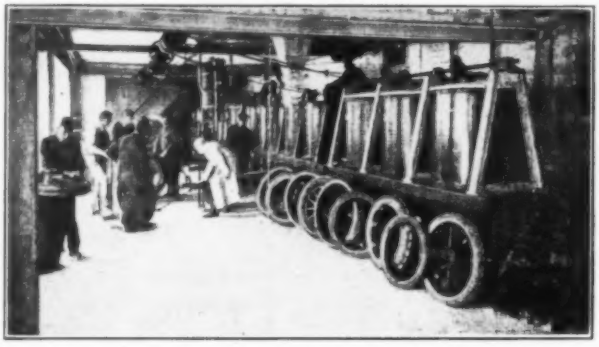
"NEWMASTIC" TIRE FILLING PLANT.

the casing stretch excessively under severe usage it may be hardened by pumping a small quantity of the liquid into the tire.

To the second class of tire fillers belong those which are first molded from sponge rubber stock to fit the various casings on the market and when inserted simulate the effect of an inflated inner tube. The "National" filler is one of this type, and is placed in the casing in sections, end to end, after which the tire is applied to the rims of the wheel by means of a special tool provided for the purpose.

Zuber's patent solid filler consists of molded blocks of sponge rubber, the ends of which overlap when fitted within the casing. Closed air chambers in each block provide additional resiliency.

The third class, puncture fluids, is of value chiefly for bicycle and motorcycle tires. It embraces those mucilaginous preparations, rarely compounded of rubber, which hold in suspension solids or fibers, such as whiting, graphite or asbestos, and which



"RUBBERINE" TIRE FILLING PLANT.

harden instantly upon exposure to air. Enough of the liquid is pumped into the tube under pressure to coat its inner surface with a thin layer occupying only about five per cent of its volume. This viscous compound is evenly distributed by rotation of the wheel, and in case of a puncture is at once forced into the hole by air pressure, where the minute obstructions in suspension form a clot and facilitate immediate hardening of the compound into a permanent plug. "Bale's Puncture Plugger," "Neverleak" and "Tire Treat" are among the well-known fillers of this class.

While puncture fluids take care of ordinary tack and nail holes, large cuts and blow-outs still require patching and vulcanizing, which are less easily accomplished after employing some of the preparations on the market. "Cyco," however, is said to be made of vegetable gums which do not interfere with vulcanizing and which preserve the rubber. The same is claimed for the "Glines' Liquid Rubber."

"Permanit," an imported preparation, occupies a unique position in this class. It comes in the form of a powder, eight ounces of which is pumped into each tube. One and one-half ounces of water is then injected and the wheel rotated slowly 10 to 20 times, in order to distribute the powder thoroughly. "Permanit" is neither soluble in water nor does it become a paste, glue or fluid, but when a puncture occurs and the powder comes in contact with the outer air a chemical reaction takes place whereby the injured part is instantly healed. One treatment will last at least a year, and a tube can be vulcanized with the powder in it should a blow-out make that necessary.

RUBBER BELTING AND OTHER SUBSTITUTES FOR SOLE LEATHER.

Owing to the high cost of leather, English manufacturers are using substitutes for both uppers and soles of the shoes, some of which are furnished to the troops. Linen duck coated with a mixture of wood tar, pitch, turpentine oil, cork powder and rubber cement are joined together in several thicknesses, compressed between powerful rollers and then cut into soles. The material can be easily sewn and pegged, and seems to serve its purpose admirably.

This is not a new idea. Some shoe finders in this country have for years been purchasing scrap rubber belting and cutting it into half soles to sell to shoe repairers, who find that such soles wear admirably, especially in mining districts.

What the Rubber Chemists Are Doing.

COEFFICIENT OF VULCANIZATION AS A CHECK ON THE STATE OF CURE.

DR. O. de Vries, Director of the Central Rubber Station at Buitenzorg, Java, publishes in "The India Rubber Journal" (January 20, 1917) a paper in which he presents proof "That the chemical process of the combination of rubber and sulphur is in itself quite independent of the physical one determining the position of the stress-strain curve."

Following is his presentation in condensed form:

The large differences in coefficient of vulcanization, noted by Schidrowitz and Goldsborough, are not found by Dr. de Vries in actual vulcanization practice, who points out that the percentage of combined sulphur does not increase at temperatures below 80 degrees C. On the other hand, the curve shifts its position even at ordinary temperatures, as shown by plotting the figures for the heating points after different lengths of time. These points are demonstrated by several series of experiments. The first, in which a number of samples of the same crêpe rubber were vulcanized together but tested at different times, shows only small changes in the coefficient of vulcanization, the percentage of combined sulphur not increasing perceptibly. The position of the curve (length at load of 1.30 kilograms) changes a total of 42 per cent in length and in this case carries with it practically no difference in coefficient of vulcanization. The same effect is reached by keeping a vulcanized sample for a longer time. It is not necessary to make experiments for many months at the ordinary temperatures, a few days at 70 to 75 degrees C. have the same effect. The curve proceeds lower down on the paper, just as it does when the time of cure is lengthened, but the percentage of combined sulphur remains the same. From these experiments it is clear that the reaction between sulphur and rubber, and the changes in the rubber-sulphur mixture which determine the mechanical properties as expressed by the stress-strain curve, are two different processes, which may proceed independently, and that, in general it is not feasible to make deductions from one regarding the other. It may be assumed that the mechanical properties are more important, and that the curve is a better gage to judge of the properties of the cured rubber than the chemical condition as expressed by the coefficient of vulcanization.

METHODS OF ANALYSIS.

NITROGEN IN RUBBER.

B. J. EATON and F. W. F. Day, in the "Agricultural Bulletin," Federated Malay States, August, 1916, describe their investigations on the distribution of nitrogen in coagulum and serum of *Hevea* latex. One hundred parts by weight of latex yielded 67 parts of wet coagulum and 33 parts of serum, the coagulum being lifted from the pan and allowed to drain for a short time before weighing.

Following are the weight percentages of nitrogen contents of the various portions: latex, 0.11; wet coagulum, 0.15; serum, 0.06.

The nitrogen content of the serum, which was contained in a tall, covered cylinder, fell after 14 days to 0.04 per cent, and after 60 days to an average of 0.03 per cent, after which no further loss appeared to take place.

One hundred parts, by weight of latex, yielded 67 parts by weight of unpressed coagulum or slab, and this on hand rolling was reduced to 50 parts by weight containing 0.26 per cent of nitrogen, equivalent to 0.78 per cent of nitrogen calculated on dry material.

Samples of similar coagulum were converted to sheet and crêpe on the day following coagulation with the following results:

One hundred parts, by weight of latex, yielded 19.7 parts of wet sheet containing 0.30 per cent nitrogen, equivalent to 0.35 per cent calculated on dry weight, which on drying was reduced to 16.9 parts of sheet containing 0.38 per cent nitrogen. Also, 100 parts, by weight of latex, yielded 21.3 parts of wet crêpe containing 0.30 per cent nitrogen, equivalent to 0.38 per cent of nitrogen calculated on dry material. This on drying was reduced to 16.9 parts of dry crêpe containing 0.40 per cent nitrogen.

Thus the nitrogen content of the dry sheet is only slightly lower than that of the dry crêpe. It was observed that the nitrogen content of the sheet and crêpe is about twice as great as that of coagulum left unpressed for a period of six weeks and then washed and crêped, and nearly twice as great as that calculated for the dry coagulum after keeping, showing that little or no alteration of nitrogenous constituents of the rubber has been effected in the sheet and crêpe, causing the formation of nitrogenous substances soluble in water or gaseous loss of nitrogen in any form.

METHODS OF TEST.

PHYSICAL TESTING OF RUBBER MATERIALS.

THE following methods are standard for the physical examination of vulcanized rubber goods as specified by the Board of Estimate and Apportionment of New York City.

SAMPLING. The contracting department shall select and take all samples for testing. The number of samples and the quantity to be taken from the deliveries will depend upon the size of the articles and the quantity delivered.

Samples shall fairly represent the delivery, and pieces shall be taken from not less than one per cent of the number of units delivered.

AVERAGES. The results of tensile strength, elongation and set tests as reported, shall be the average obtained from the samples received by the laboratory. Not less than three test pieces from each sample shall be tested and their results taken in calculating the average unless some individual result is apparently in error, in which case a retest shall be made.

TEMPERATURE OF TESTING ROOM. Physical tests of rubber shall be made with the temperature of the air not lower than 65 or higher than 90 degrees F.

TIME. All measurements of time shall be taken with an accurate stop watch.

PREPARATION OF TEST PIECES.

Test pieces of rubber shall be stamped out with a die, whenever practicable to do so.

TENSILE STRENGTH, ELONGATION AND SET TEST PIECES. Test pieces of rubber for tensile strength, elongation and set tests shall be cut out with a die, either of the constricted bar or ring type. The same test piece shall be used for making all three tests. When the bar test piece is prepared a die should be used that will make the constricted part of such a width that the cross section will be approximately one thirty-second of a square inch.

All pieces for these tests shall have the backing entirely removed, and any corrugations or irregularities of any kind shall be accurately buffed off to make a uniform smooth surface.

Test pieces which have become burnt in buffing shall be discarded.

Test pieces shall be kept constantly wet during the buffing.

Test pieces of rubber valves and odd-shaped rubber articles shall whenever possible be cut down on a lathe to an even thickness of not more than one-eighth inch and then cut out to shape for testing with a die.

If it is necessary to use naphtha to remove the backing or to separate the rubber from the plies, the naphtha shall be what is technically known as 76-degree Baumé, free from oil.

When naphtha has been used the test pieces shall be allowed to remain at rest for not less than one hour before testing.

In all cases where backing is removed and buffing done, the test pieces shall remain at rest for not less than ten minutes before testing.

FRICTION TEST PIECES. Test pieces for friction or adhesion tests shall be cut and prepared as follows:

All kinds of hose, round packing and similar articles shall be cut transversely unless the diameter is so small that a practical measurement cannot be taken, in which case the test pieces shall be cut longitudinally.

Belting, packing or gasket material may be cut in any direction.

Test pieces from washers, ferrules (sleeves) molded gaskets and other odd-shaped articles shall be prepared in the manner called for in the unit specification, if it is impracticable to prepare them in accordance with these rules.

Cotton rubber-lined hose test pieces and braided hose test pieces shall be accurately cut transversely two inches wide and full length of the circumference. They shall be cut through the walls so that they can be laid out flat the full length of the piece. One-quarter inch of the rubber lining shall be carefully and cleanly trimmed off on each side, without injuring the fabric, leaving a strip of rubber lining one and one-half inches wide undisturbed on a strip of cover two inches wide. A separation between lining and cover of this strip shall be started for about one and one-half inches.

Test pieces of wrapped hose, round packing and similar articles shall be accurately cut transversely one inch wide, and left circular, to permit sliding on to a mandrel. A separation between the rubber and the fabric or between the layers in accordance with the test to be made shall be started full width of the piece and far enough distant to permit proper fastening of clamps or hooks, as the case may be.

Solid round packing and similar articles shall have a core drilled out for the mandrel.

Fabric-backed rubber packing test pieces shall be prepared in the same manner as for cotton rubber-lined hose, except that if the rubber part is more than one-eighth inch thick, the test piece shall be prepared exactly opposite, leaving a strip of sheeting one and one-half inches wide on a strip of rubber two inches wide. A separation between sheeting and rubber shall be started for about one and one-half inches.

Belting test pieces shall be accurately cut one inch wide and shall be stripped down to all but two plies, and a separation of the two plies started for about one and one-half inches.

All pieces of flat material such as packing gasket, belting, etc., shall be cut not less than 12 inches long whenever possible.

DETERMINATION OF TENSILE STRENGTH.

The determination of tensile strength of the rubber compound shall be made as follows:

APPARATUS. All tensile strength tests shall be made on an apparatus the general design of which conforms to the Schopper machine.

GRIPS. When bar test pieces are used, the grips for holding the test pieces shall be such that they will tighten automatically, exerting a uniform pressure proportionate to the applied tension across the full width of the piece, regardless of any variation in the thickness of the rubber.

RING TEST PIECES. These shall be placed over the revolving rollers of the Schopper machine.

MARKING BAR TEST PIECE. The bar test pieces shall be stamped in center portion with two lines two inches apart, using a rubber ink pad stamp. The distance between the outside edges of these stamped lines shall be accurate to one one-hundredth of an inch.

MEASUREMENT OF BAR TEST PIECE. The width and thickness of the test pieces shall be accurately determined at three points equidistant between the marks, a spring gage or ratchet stop micrometer being used.

MEASUREMENT OF RING TEST PIECE. The width and thickness of the test ring shall be accurately determined at not less than four opposite points on the ring, care being taken to get the minimum cross section as near as possible, the area of which shall be used in computing the tensile strength.

BREAKING. Bar test pieces shall be tightly fastened in the jaws and brought just taut. The machine shall then be started and the speed so regulated throughout the entire test, that the jaws separate at the uniform rate of 20 inches per minute.

The number of pounds necessary to break the test piece shall be read to the nearest tenth of a pound and computed to pounds per square inch, using the measurements nearest to the break.

When breaking the ring test piece the ring shall be slipped over the revolving bearing provided for it and the procedure continued exactly as for the bar test piece, the speed being so regulated that it will give an equivalent elongation of test piece per minute.

TENSILE STRENGTH ACROSS THE SEAM.

Bar and ring test pieces shall be prepared as usual, except that the seam shall not be buffed off.

In cutting, the seam shall be centered in the middle of the bar test piece, at right angles to the axis, as nearly as possible.

The center of the seam shall be made to lie along a diameter of the ring test piece as nearly as possible.

The calculation shall be based on the average cross section in both kinds of test pieces in the usual manner, but excluding the cross section of the seam or seams.

ELONGATION AT THE BREAKING POINT.

The elongation at the breaking point shall be accurately determined during the tensile strength test as follows:

On the bar test a rule graduated to hundredths of an inch shall be kept opposite the two marks and the distance the outside edges of these two marks are apart at the instant of breaking shall be noted.

This distance shall be computed into per cent of elongation, *i. e.*, if the marks are twelve inches apart at the break, that piece would have 500 per cent elongation.

RING TEST PIECES. These shall have the elongation read to the nearest whole per cent from the automatic record on the stretch tapes.

DETERMINATION OF SET.

The determination of set shall be on the test piece as broken in the tensile strength test not less than one nor more than one and one-half minutes after breaking. Time shall be taken with a stop watch.

BAR TEST PIECES shall have the distance from the outside of the line to the furthest broken point measured carefully along the axis on one broken portion to the nearest one-hundredth inch, and in the same manner from the corresponding nearest broken point on the other portion. The sum of these two measurements, minus two inches, is the actual set, and shall be computed to percentage of the elongation at rupture to the nearest tenth per cent.

RING TEST PIECES shall have the inner circumference carefully measured around a solid disk of the same diameter as the inside diameter of the original ring. The increase in length (actual set) is read to the nearest half per cent, divided by the per cent elongation at rupture, and the result recorded to the nearest tenth per cent.

DEFECTS.

If the break occurs outside the gage marks on the bar test piece during the tensile strength test, the specimen shall be considered as defective for any determination, and another test made.

The broken surfaces of both test bars and test rings shall be examined for flaws or defects, and if the results of the tests confirm the observation of flaws the test pieces shall be replaced by others.

(To be continued.)

CHEMICAL PATENTS.

THE UNITED STATES.

INSULATING COMPOSITION. A phenolic condensation product, initially fluid, transformable by heat without substantial change of volume into a homogeneous, impervious, and infusible solid of high insulating value. [Leo H. Bakeland, Yonkers, New York, assignor to General Bakelite Co., New York City. United States patent No. 1,213,144.]

PROCESS FOR RECOVERING RUBBER WASTE. The process of recovering rubber waste containing fibrous material, which comprises dividing the waste into small particles, disintegrating the fibrous material by treatment with acid, neutralizing the acid with a suitable base of an alkaline earth (in excess), working the resultant solid and liquid components into a homogeneous mass, and then adding a devulcanizing agent and a saponifiable oil. [Richard F. Kinsley, East Cleveland, John D. Morton, Lakewood, and Charles R. Haynes, Cleveland, assignors to Mechanical Rubber Co., Cleveland, all in Ohio. United States patent No. 1,215,941.]

TIRE FILLING COMPOSITION. A composition of the following ingredients: China wood oil, 72 per cent; chloride of sulphur, 8 per cent; oxide of magnesium, 7 per cent; comminuted cork, 13 per cent. [Clarence C. Turner, assignor to John A. Schmidtke—both of Portland, Oregon. United States patent No. 1,216,249.]

THE DOMINION OF CANADA.

VULCANIZED RUBBER ARTICLE. Vulcanized rubber having the structural characteristics of partially broken down rubber. [Canadian Consolidated Rubber Co., Limited, Montreal, Quebec, assignee of Claude D. Mason, Naugatuck, Connecticut, Canadian patent No. 172,568.]

VULCANIZED RUBBER PROCESS. Method of making vulcanized rubber by partially breaking down crude rubber to a sheet form with rugose structure and appearance and vulcanizing the sheet in such condition. [Canadian Consolidated Rubber Co., Limited, Montreal, Quebec, assignee of Claude D. Mason, Naugatuck, Connecticut. Canadian patent No. 172,569.]

RECLAIMING RUBBER WASTE. The process of reclaiming rubber waste containing lead and sulphur by adding a soluble reactive substance to the waste adapted to produce light-colored, water-insoluble compounds with the lead and sulphur. [Canadian Consolidated Rubber Co., Limited, Montreal, Quebec, assignee of Harold R. Murdock, Naugatuck, Connecticut. Canadian patent No. 172,570.]

VULCANIZING PROCESS. A new composition of vulcanized rubber free from lead sulphide and containing lead sulphate and zinc sulphide. [Canadian Consolidated Rubber Co., Limited, Montreal, Quebec, assignee of Harold R. Murdock, Naugatuck, Connecticut. Canadian patent No. 172,571.]

RECLAIMING RUBBER. In a process for the disintegration of fibrous cellular material the treatment of such material with a protein in the presence of heat. A reclaimed rubber compound containing decomposition products of albumin, carbohydrates and cellulose. [Canadian Consolidated Rubber Co., Limited, Montreal, Quebec, assignee of Harold R. Murdock, Naugatuck, Connecticut. Canadian patent No. 172,572.]

RECLAIMING RUBBER. A process involving the disintegration of fibrous cellular material, by treatment with a carbohydrate sugar and starch, having a non-fibrous structure and capable of hydrolysis under the conditions of devulcanization, the resulting products of which decompose the fibrous material. [Canadian Consolidated Rubber Co., Limited, Montreal, Quebec, assignee of Harold R. Murdock, Naugatuck, Connecticut. Canadian patent No. 172,573.]

THE UNITED KINGDOM.

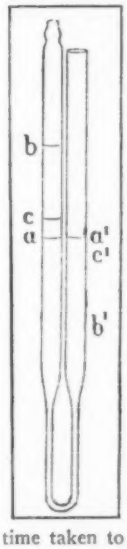
RUBBER COMPOSITION. For solid tires and mechanical goods a composition consisting of Congo rubber, 17; lithopone, 25; sulphur, 2½; glycerin, ¼; finely powdered silica, 2½ parts. [A. Nixon, Manchester, England. British patent No. 16,883 (1915).]

FILLING FOR TIRES. A composition consisting of preferably 4½ pounds of glue, 3 pounds of water, 12 pounds of glycerine, 8 ounces of camphor dissolved in alcohol, and 8 ounces of formaldehyde, or its equivalent, is used for filling inner tubes of pneumatic tires. [J. Flint, G. Bolton, and W. A. McLaughlin, Camberra House, Elizabeth street, Sydney, New South Wales, Australia. British patent No. 14,272 (1915).]

LABORATORY APPARATUS.

VISCOSIMETER.

IN viscosimeters of the Ostwald type it is customary to immerse the whole apparatus in a medium of high boiling point. The use of a fairly large quantity of some oil or wax, transparent at the temperature of observation, is thereby necessitated.



In the simple instrument devised by Allan Speedy, described in the "Journal of the Society of Chemical Industry," June 15, 1915, all difficulty in reading the marks is avoided by placing them above the surface of the liquid, which, therefore, need not be transparent and of which only a moderate quantity is required.

The instrument consists of a piece of glass tubing drawn out to form a capillary and bent into V shape, as shown in the figure.

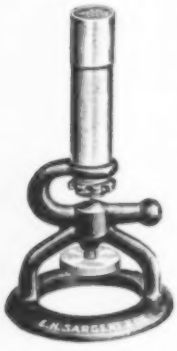
The liquid of which the viscosity is to be determined is placed in the viscosimeter, which is clamped vertically in the bath so that the level marks *aa'*, are just above the surface of the heating liquid. The bath is heated to the required temperature and after a few minutes the levels *aa'*, are carefully adjusted. By means of a piece of rubber tubing the liquid is then slowly sucked up the left limb of the tube until it passes the level, *b*. It is then allowed to descend. The time taken to fall from *b* to *c* is recorded by a stop watch ,and the experiment repeated as a check. It is only the viscosity of the liquid in the capillary tube that counts. Because of the thinness of the tube wall the temperature of the liquid is the same as that of the bath. It should be observed that the column of liquid *bc*, never reaches the capillary. The level, *b'* is well above the point where the constriction in the right limb of the tube begins. The time of flow is taken from *b* to *c* only, because on approaching *a* the motion becomes slow and irregular. The constant of the instrument can be obtained by calibrating it with pure phenol or sulphuric acid.

The instrument may conveniently be strapped to a thermometer and suspended in the heating liquid, which is contained in a boiling tube. The cheapness of the apparatus renders it possible to choose from a range of tubes one with a capillary of diameter best suited to the viscosity of the liquid which is to be investigated. The best results are obtained if the time of flow is about one to two minutes at the temperature of observation.

The instrument is well adapted to measuring the viscosity of rubber solutions, oils, solvents and other liquids. Its extreme simplicity, and the increased accuracy due to choice of a suitable capillary, as well as its convenience in use recommends it to all who have measurements of viscosity to make. These instruments are obtainable from Messrs. Townson & Mercer, Limited, Camomile street, London, E. C., England.

ADJUSTABLE HIGH-TEMPERATURE BURNER.

THE illustration shows a high-temperature burner adjustable both as to the air and gas supply, and suitable for use with any gas except acetylene. An important feature in this form of burner is that the flame may be controlled without changing the position of the crucible, due to the fact that the chimney does not move in its adjustment. It is particularly desirable in operations which call for a blast lamp. [E. H. Sargent & Co., Chicago, Illinois.]



THE SHORE SCLEROSCOPE.

The standard scleroscope is now provided with a special hammer for use in testing the rebound of cured rubber, in place of the diamond-pointed hammer used on metals. This instrument is well known all over the world in connection with testing the hardness of metals by measuring the rebound under a definite blow from a hammer raised and released pneumatically from a constant height.

The illustration shows the instrument mounted for testing small specimens. It is easily detachable from its base for operation on a swing arm for testing larger pieces on a bench. It may also be used free hand for testing still larger pieces in any location. [Shore Instrument & Manufacturing Co., New York City.]

CONTROL OF FACTORY OPERATIONS.

In an article on Factory Control and Research ("The Times Trade Supplement," London, December, 1916), Mr. W. A. Williams discusses the functions of the rubber chemist in relation to manufacturing problems. He suggests that laboratory control should be divided into three departments:

A. Dealing with chemical questions other than those concerned with actual operations, including all research work, the investigation of competitors' productions, the improvement of current manufacturing operations and the investigation and perfecting of new lines of manufacture.

B. Dealing with all actual production operation; control of the finished factory production, checking against specification and standard qualities, including control of power plant and steam raising.

C. Dealing with production of compounds for standard factory specifications, and investigation of new compounds.

The latter department should be equipped with a manufacturing plant on a small scale, with which all investigations of running and vulcanizing can be carried out, and where tests can be made, independent of the large-scale factory operations. These under no conditions should be interfered with. Experimental work should be kept entirely out of the factory. It is only when the experiments have been completed and standardized that the operations on a large scale should be adopted.

The functions of departments *B* and *C* are in connection with the daily work of the factory, in order to ensure smooth and efficient operation, and reliability of the finished products. Their operations are concerned with the manipulation of the grades of rubber employed in specific classes of articles and with the many other ingredients entering into manufacturing operations.

SCLEROSCOPE AND BALL REBOUND.

Contributed.

THE accompanying chart shows the relative rebound of various qualities of rubber pump valves, solid tires, vulcanite and other ordinary qualities.

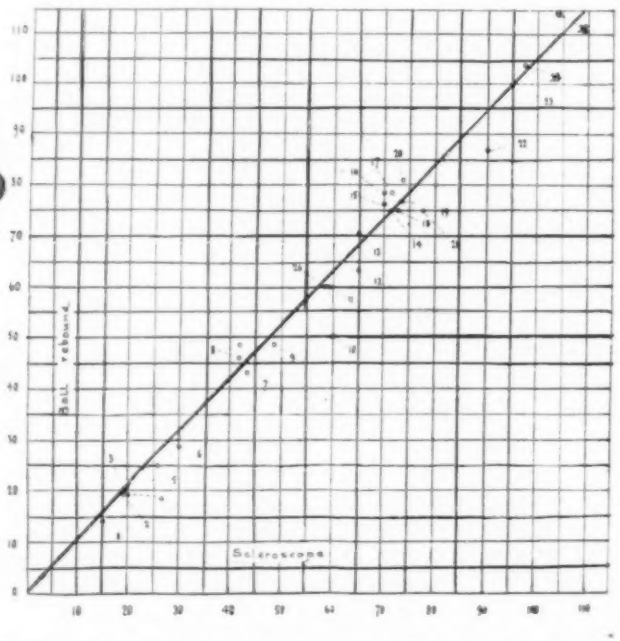
The tests were made in connection with a study of pump valves. The Shore Scleroscope was used with a special rubber hammer, having a small flat steel striking face in place of the usual diamond point used in tests on metals.

The ball rebound was obtained from the same rubber samples from which balls were cut, of three-quarter-inch diameter. These were dropped from a height of about 20 times their diameter onto a smooth cast iron base supporting a scale identical with that used in the scleroscope.

The different rubbers used differed widely in specific gravity and composition, but these differences do not influence the agreement of the rebound of the scleroscope and ball method.

The straight line drawn through the plotted readings passes from zero through 100, the rebound of a ball of pure unvulcanized Para rubber, whereas the scleroscope on this material showed 95.

Thus all scleroscope readings may be taken as representing 95 per cent of the height of rebound which could be obtained



with a ball made of the same rubber dropped from a height approximately 15 or 20 times the diameter of the ball.

The numbered plottings correspond to the following descriptive list of samples.

Numbers 1 to 6 inclusive are rather hard but of low elasticity.

All tests were made at 65 to 73 degrees.

LIST OF SAMPLES CHARTED.

1. Pump valve.
2. Pump valve.
3. Pump valve.
4. Pump valve.
5. Pump valve.
6. Pump valve.
7. Bottle stopper.
8. Pump valve.
9. Pump valve.
10. Solid toy ball.
11. Solid tire.
12. Slab No. 2.
13. Solid tire.
14. Solid tire.
15. Slab.
16. Solid tire.
17. Solid tire.
18. Solid tire.
19. Slab No. 3.
20. Solid tire.
21. Para with 10 per cent sulphur.
22. Slab No. 1.
23. Unvulcanized Para.
24. Pump valve (hard).
25. Vulcanite.
26. Eraser rubber.

New Machines and Appliances.

AUTOMATIC STRENGTH AND ELASTICITY TESTER.

THIS instrument is constructed so that it generates its own power by the use of a weighted carriage, the speed being controlled by an oil filled cylinder. Thus the material to be tested is stretched in a uniform manner during the testing period. It is used for testing yarns, threads and both vulcanized and unvulcanized rubber.

This instrument is made for breaking strengths of from 5 to 3,000 grams or 1-5 of an ounce to 6½ pounds.

To improve the sensitiveness of this instrument its strength scale is made in two parts, one for the fine yarns having a breaking strength of only a few ounces, and the other for the coarser ones. For the latter an additional weight is added to the upper weight lever.

In this apparatus the piston rod is connected with a carriage which holds the lower set screw. To prevent vibrations this carriage glides on rollers along the standard and a special guide bar. This carriage is held in its upper position by a lever and it is in this position that the oil has to be poured into the cylinder, when setting up the instrument. The tests may be made in two ways, viz:

By either fixing a single length of thread, or threads, between the upper and lower screws, or by placing the threads upon a little wheel placed on same pin as the upper screw and tightening the two ends with the lower clamp screw. In the latter case a double length is tested and accordingly the strength result has to be divided in two, since two lengths are tested at one time.

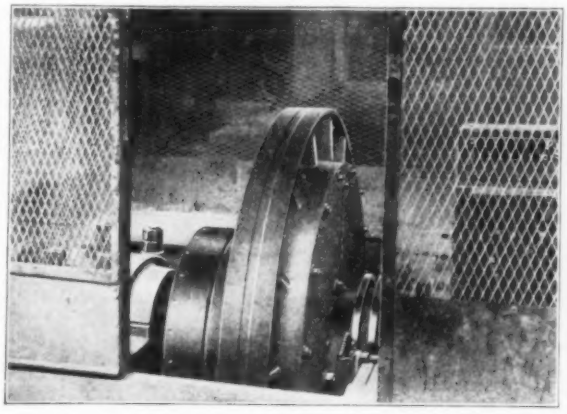
The elasticity in both cases is shown for the single span and this is either in millimeters or inches and fractions and also in per cent directly.

The strength dials are made either in English or metric system of weight. [Alfred Suter, New York City.]

A LARGE MAGNETIC CLUTCH INSTALLATION.

That all rubber mills should be provided with a positive, quick-acting clutch on the mill lines is without question. The danger of operatives being caught in the rolls is ever present, and in case of accident serious injury may be mitigated and the loss of life prevented by an efficient clutch installation. It is, moreover, an important power economy in that it gives gradual acceleration in starting the heavy mill rolls.

The illustration shows a 78-inch C. & H. magnetic clutch, with a capacity of 2,200 horse power at 100 revolutions per minute, that was recently installed in the plant of the Goodyear Tire & Rubber Co., Akron, Ohio. It is said to be the largest clutch of this type in the rubber mill service. The clutch consists of a solid circular steel casting mounted on the mill end of the shaft, having embedded in its periphery a single cylindrical magnetizing coil, the terminals of which are brought out to an ordinary pair of slip rings. Mounted concentrically with the coil and outer periphery is an adjustable friction ring so that the metal faces of the driving and driven member do not come directly in contact with each other. This also serves the purpose of a permanent air-gap in the magnetic circuit. The other member of the clutch, keyed to the driven or rope-pulley side of the shaft through a flexible coupling, consists of a circular steel armature secured to the hub by a flat circular spring plate. When the mag-

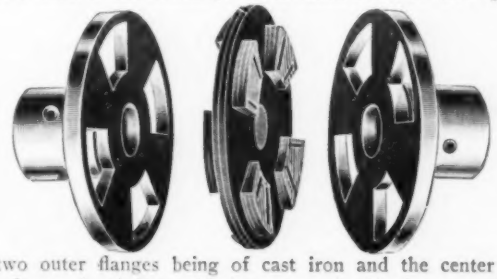


netizing coil is energized, this circular armature is drawn towards the driving member of the clutch, the motion along the shaft being accomplished by a slight dishing of the spring plate upon which it is mounted. This particular form of clutch possesses the advantage of instant disconnection in case of interruption of the magnetizing current, and does not require a portion of a revolution for its disengagement. There is no tendency, moreover, for it to either release or to lock itself due to the mechanical forces exerted as it comes up to speed and while it is running at full speed.

There is a slack cable switch mounted in a frame on the right of the clutch connected to a rope and overhead torsion rod, which automatically causes the clutch to disengage in case any of the driving ropes of the main steam engine drive should break. [The Cutler-Hammer Clutch Co., Milwaukee, Wisconsin.]

THE GRUNDY FLEXIBLE INSULATED COUPLING.

Where it is difficult to get the shaft bearings in perfect alinement, or where they are liable to get out of line, the simple and effective device here shown is recommended for connecting the two ends of the shafting. It is constructed of three pieces,



the two outer flanges being of cast iron and the center disk of leather or hard fiber with lugs on each side for transmitting the power to the outside flanges.

The leather lugs are cut on a bias, tapering towards the disk, the cast iron driving flanges being machined with a corresponding taper, which has a tendency to draw the flanges close to the disk, and to cause the leather lugs to receive and transmit the power at their strongest points.

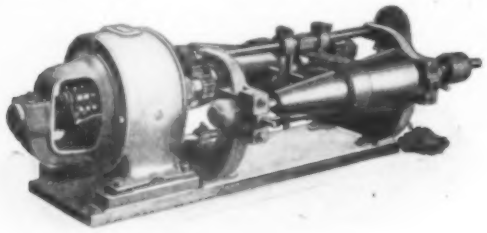
The close connection made possible by this type of coupling,

reduces to a minimum the leverage so objectionable in the ordinary coupling. They are furnished in standard sizes, from ¾ to 500 horse power at 100 revolutions per minute. [Charles Bond Co., Philadelphia, Pennsylvania.]

MOTOR-DRIVEN VARIABLE SPEED DRIVE.

Changes in speed are very necessary in a large number of mechanically performed operations in rubber goods manufacture, hence the demand for a progressive or variable speed changing driver. In the larger and more modern mills, calenders are invariably driven by motors provided with effective controllers of the electrical type that provide a wide speed variation. There are, moreover, many machines outside of the calender room where varying speed conditions may be met in a satisfactory manner by a motor-driven speed change device of the type shown in the accompanying illustration.

This device consists essentially of a pair of cone pulleys, over which runs an ordinary leather belt. Under the belt the surface of each cone is built up from conical to cylindrical form by a patented cone pulley transformer. Each consists of a series of tapering leather strips riveted to an endless belt, the strips being so formed as to give a crown like that of an ordinary pulley.



To effect a change of speed these transformers are shifted along the cones, without stopping the machine, by a screw and chain, as the illustration shows.

While they are in contact with a cone they run exactly as if a part of it. The angle of the cones is such that there is no tendency to slip or creep endwise. The belt may be of any desired width up to the full width of the transformers.

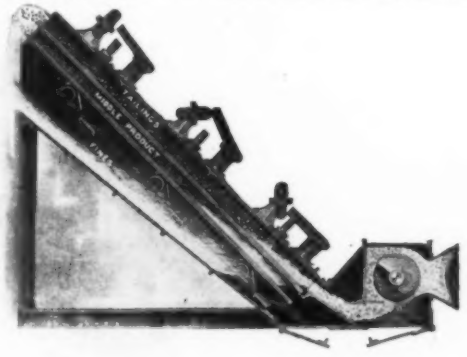
These speed changes are furnished complete in vertical or horizontal countershaft types for floor or ceiling attachment, and from 1 to 200 horse power. [The Moore & White Co., Philadelphia, Pennsylvania.]

THE NEWAYGO MECHANICAL SCREEN.

In the preparation of rubber dust and other finely divided products used in the manufacture of hard rubber and composition soles and heels, the mechanical screen plays an important part. In some cases it is necessary to remove the fiber from the rubber. In others, a certain portion of the fabric is retained in the finished product, while in the case of hard rubber grinding, there is no fiber to contend with. These variable conditions and final products are controlled by a mechanical screening process.

The material is first broken down to about ¼ to ½ inch on a cracker and then passed through a 42-inch horizontal grinding mill from which it is delivered to a screen that takes out the fiber and the 40-mesh material. The tailings are then passed through a second mill and over a second screen that removes the 40-mesh material and completes the screen operation.

The distribution of the feed over the entire width of the screen cloth is effected by a screw conveyor and an adjustable feed board at the top of the machine. The various products are taken away at the bottom of the screen. These machines are constructed with one, two and three screening surfaces and, therefore, can deliver from one to four products from a single separator. Practically no power is required to drive them. In fact, 1 horsepower runs the largest size. The capacity is very large as the entire screening surface is in constant use and the meshes are

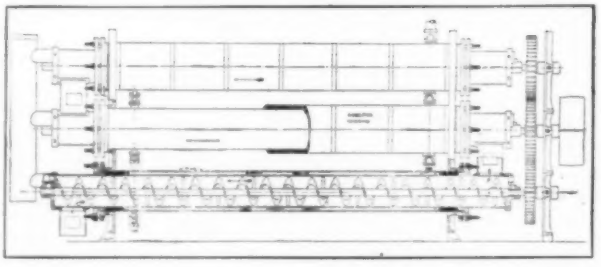


kept open by mechanical vibration thus allowing the fine material to pass through the screen.

It is practically dust-proof and fire-proof as practically no wood is used in the construction. [Sturtevant Mill Co., Boston, Massachusetts.]

THE WOLF VACUUM STEAM DRYER.

The process of drying reclaimed rubber and the elimination of all moisture in the dry fillers and other materials used in rubber manufacture is of well known importance to the trade. The Wolf vacuum steam dryers are constructed in units and a side elevation of the three-cylinder type is shown herewith. The outer shells of the cylinders are covered with asbestos, while the inner shells are machined and contain spiral conveyors of the rubber type provided with unifying paddles at each flight. Steam is piped to the chambers between the inner and outer shells and an efficient steam trap removes the condensation.



The material to be dried is delivered to the top cylinder in which it is agitated continuously and conveyed in the same manner through the succeeding chambers and finally discharged in a uniformly dried condition. All gears are provided with gear guards and the drive end is supported by outboard bearings. [The Wolf Co., Chambersburg, Pennsylvania.]

SPECIAL MACHINES.

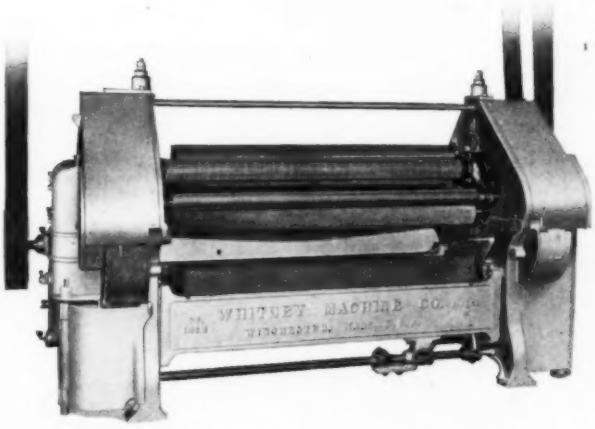
RUBBER AIDS IN UNHAIRING HIDES.

THE removal of hair from hides is an important process in the tanning industry and one that at first thought would not appear to be particularly difficult. Yet when a hide varies in thickness from 3/16 to 9/16 of an inch the operation requires considerable skill. For that reason experienced workmen with special knives were formerly thought indispensable in removing the hair without cutting the hides.

When unhairing machines were first used the difficulty of allowing for variations was apparent, the human element being eliminated. Now it appears that rubber is called upon to replace the hand workman's intelligence. Rubber rolls of soft vulcanized

stock, rubber cylinders with air-filled centers and endless, soft rubber bolsters are now in general use.

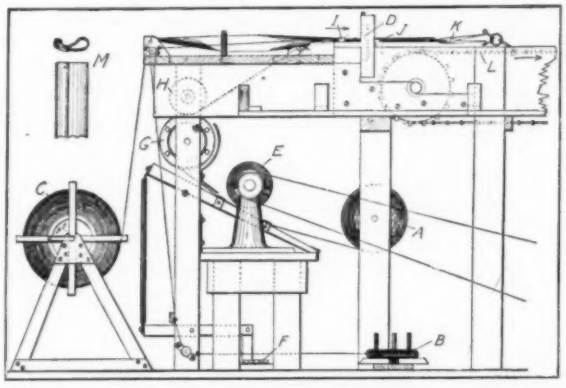
In operation the hide is passed over the rubber cylinder or



bolster against which it is held by a feed roller. The rubber bed yields to the surface inequalities, while the operating blades completely remove the hair from the hide.

MAKING WEATHER-STRIPS.

One of the many minor lines of manufacture in which rubber forms an important part, is that of the ordinary weather-strip for doors and sashes. Such strips generally utilize only low grade reclaimed stock in the form of rubber-coated thin fabric and light cloth insertion packing. The rubber is combined with



wood or metal strips in the form of an open tubular fold, with the edges held securely in the body of the strip. In making the double edge wood strip, the rubber sheeting is first cut accurately into strips in a slitting machine. The edges are glued and the strips are inserted in grooves in the wooden strips cut to receive the glued edges of the rubber. The most common form of weather-strip is that made by folding the rubber into strips of sheet brass, zinc or copper. This form is inconspicuous when applied and is the only kind adapted to many locations, such as around sashes of railway coaches for excluding dust and preventing vibration. These weather-strips vary in width from ⅜ to ⅞ of an inch and are often made in continuous lengths of 100 feet.

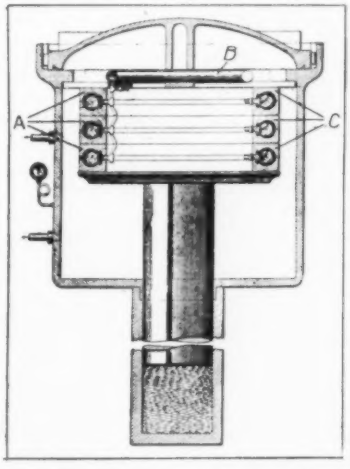
The manufacture of weather-strips is accomplished in automatic machines with special dies and folding devices to form the flat metal ribbon around the rubber, with the edges folded in such a manner as to avoid cutting the rubber. After forming the strip the machine automatically punches holes at regular intervals in the metal for tacking the weather-strip in place.

The machine shown in the illustration takes the metallic strip from a stock roll and folds it over a strip of rubber or other flexible material. The feature of this machine is a die, through which the metal and rubber strips are simultaneously drawn, and which folds the metal over the rubber. *A* is the strip of metal formed in a roll and mounted on the frame of the machine. *B* is a coil of wire which passes through the die and forms the reinforcement for the completed strip. *C* is a roll of rubber of suitable width. These three parts are passed over suitable guides and into the forming die *D*, which folds the metal strip around the wire and clamps the rubber strip. As the metallic strip *A* is unwound from the stock roll it passes under a buffing wheel *E*, being forced up against this wheel by means of a pedal *F*. The strip then passes between rollers *G* and *H* and thence to the guide *I* where it meets the wire and strip of rubber. As the metallic strip passes between rollers *G* and *H*, it is perforated at certain distances apart by means of punches located in the rim of the roller *G*. The three parts pass through the guide *I* and thence through the forming die. As the completed strip emerges from the die, it passes over a varnishing or lacquering device *J*, which covers the metal parts of the strip with a protecting coat. After the first few inches of completed strip is formed, the end is attached to a clamp *K*, which is hooked into a sprocket chain *L* driven in the direction indicated. As soon as a sufficient length of strip is pulled through the die by means of the sprocket chain, or when the end of the chain is reached, the strip is cut off near the die and the clamp is returned and again attached to the new end of the strip, after which power is applied to the chain to force additional stripping through the die. A section of the completed strip formed by this machine is shown at *M*.

MACHINERY PATENTS.

INTERNAL PRESSURE TIRE VULCANIZING MOLD.

UNDER certain conditions the use of steam, air or water as internal pressure producing agents in curing tire casings has resulted in permeation of the structure. This is obviated in the present invention by maintaining the water that fills the casings under hydraulic pressure, while the expansion due to the heat of vulcanization is controlled in a special expansion chamber.



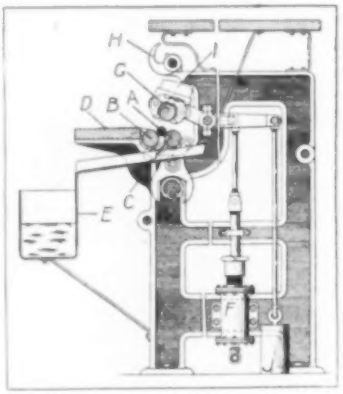
The illustration shows an ordinary press vulcanizer in which are stacked the molds *A* containing the tires to be cured. Previous to bolting down the head, water under pressure is conducted to the individual molds and the compression chamber *B*, and the air in the tires is forced out through valves *C*. The compression chamber being closed, the air cannot escape and is hydraulically compressed in the chamber serving as a cushion that compensates for the expansion of the water in the tires. [Nelson W. McLeod, St. Louis, Missouri, assignor to American Motors Tire Co., Detroit, Michigan. United States patent No. 1,213,224.]

In a previous invention granted to the same inventor and the same assignee, water is compressed in a cylinder provided with a piston and coiled adjustable spring that controls the ex-

pansion of the water during vulcanization. [Nelson W. McLeod, St. Louis, Missouri, assignor to American Motors Tire Co., Detroit, Michigan. United States patent No. 1,213,224.]

IMPROVED HOSE WRAPPING MACHINE.

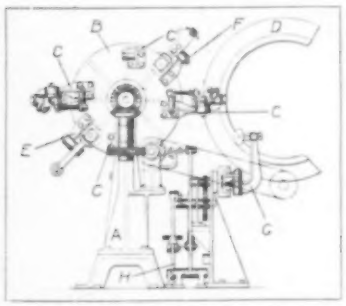
According to the customary practice in wrapping garden hose prior to curing, the movable roller is lifted by the increasing diameter of the wrapped hose and mandrel. This often results in the exterior of the hose being permanently marked in an objectionable manner when the hose is cured.



Referring to the drawing, which is an end elevation of the improved machine, *A* is the pole and hose supported by rollers *B* and *C*. The cloth wrapper *D* is placed upon the front roller *B*, and water under pressure is admitted to the three cylinders, only one of which is shown at *F*, thereby lowering the roller *G* into contact with the uncured hose. The cam *H* is then brought in contact with the wedge block *I* which maintains the roller *G* in a permanent position. The wrapper is thus wound on the hose between three rollers that are relatively stationary and as the diameter of the wrapping increases the hose is compressed on the pole and retained in this condition during vulcanization. Thus a more solid and compact hose body is produced and one free from all exterior markings or imperfections. [William P. McGeouch, Arlington, Massachusetts, assignor to Boston Woven Hose & Rubber Co., Cambridge, Massachusetts. United States patent No. 1,213,665.]

THE GRIFFITH MECHANICAL STITCHER.

In this machine the operation of stitching or shaping the fabric down around the sides of the core is mechanically and automatically performed in a smooth and even manner.

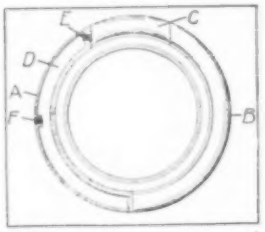


The drawing shows a side elevation of the machine and the base *A*, that supports the driving mechanism. *B* is a turret that revolves in a vertical plane on opposite sides of which are bolted four co-acting pairs of stitching tools *C*. As each successive pair of tools comes into operative position on each side of the core *D*, it shapes or stitches the fabric further around the core, a revolution of the turret completing the stitching of one fabric ply.

After a certain number of plies have been laid on the core, bead ring applying rolls *E* are brought into position and the bead rings are placed by being fed between the rolls and the revolving core. When the fabric plies are to be trimmed the device *F* is positioned and the cutting effected by the rolling action of the cutters, the requisite pressure being obtained by spring adjustment. The machine thus described is adapted to stitch the fabric plies on the core and under the bead rings, to apply the latter and stitch other plies down to the bead rings. Before the trimming is done the outer layers are stitched around the bead rings by a pair of disks carried by arms *G*, and operated by treadle *H*. [Richard Griffith, assignor to the Miller Rubber Co.—both of Akron, Ohio. United States patent No. 1,212,207.]

SELF-CONTAINED INTERNAL PRESSURE TIRE CORE.

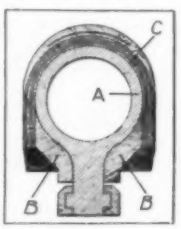
In curing tires when internal pressure is applied from a general source the necessary pipes and couplings and the possibility of leakage are features more or less objectionable. In this invention the gas or vapor under pressure is confined within the core until liberated by the action of a fusible plug.



The core is formed in three hollow sections *A*, *B* and *C*. Sections *A* and *B* are similarly constructed and the description of the former therefore will apply to the latter. The hollow chamber *D* is provided with an inlet valve *E* through which air or gas under pressure is forced; moreover, water may be introduced. The thermostatic valve, *F*, comprises a disk that is fused by the vulcanizing heat, liberating the compressed air or vaporized water which expands the casing forcibly within the mold. [Henry Z. Cobb, Winchester, Massachusetts, assignor to United States Rubber Co., New Brunswick, New Jersey. United States patent No. 1,211,918.]

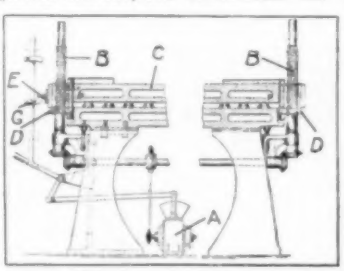
TIRE CORE WITH NON-METALLIC ANNULAR PADS.

The object in this device is to provide mechanical means whereby the fabric of the tire is stitched or expanded in the vulcanizing mold. The ring core *A* is provided with two lateral annular rings or non-metallic pads *B* and the fabric plies *C* are laid on the core, the beads applied and the casing finished in the usual manner. Before curing, the pads are removed and the casing is placed in the mold, annular parts of which engage the head flanges, forcing them in contact with the core proper. This movement stretches the casing equally from each side wall to the center of the tread, in which condition the casing is vulcanized. [Burgess Darrow, assignor to the Goodyear Tire & Rubber Co.—Both of Akron, Ohio. United States patent No. 1,212,457.]



GRAY'S VULCANIZING PRESS.

In a press for vulcanizing molds, pressure is produced by the weight of the upper platen, either by itself or with dead weight placed thereon, the mechanism for raising and lowering being incapable of producing any downward thrust. In the form shown, the upper platen is moved by a motor *A* through screw-and-nut gear *B*, *B*, the nuts which fit loosely in the steam heated platen *C* being provided with flanges *D*. The motor stop-gear consists of a projection *E* on the platen which trips the lever *G*. Instead of nuts, chains or other flexible means may be employed for raising and lowering the plate. [Christian H. Gray, India Rubber, Gutta Percha & Telegraph Works Co., Silvertown, Essex, England. British patent No. 102,272.]



OTHER MACHINERY PATENTS.

THE UNITED STATES.

1,213,223. Tire press vulcanizer. N. W. McLeod, St. Louis, Mo., assignor to American Motors Tire Co., Detroit, Mich.

1,213,225. Pneumatic tire mold. N. W. McLeod, St. Louis, Mo., assignor to American Motors Tire Co., Detroit, Mich.

1,213,525. Collapsible core. R. M. Merriam, Akron, Ohio.

1,213,600. Tire and method of making the same. W. H. Dunkerley, Paterson, N. J.

1,213,601. Tire braiding machine. W. H. Dunkerley, Paterson, N. J.

1,214,277. Apparatus for vulcanizing tire shoes. H. Z. Cobb, Winchester, Mass., assignor to United States Rubber Co., New Brunswick, N. J.

1,214,295. Method and apparatus for cutting rubber blanks. J. R. Gammeter, Akron, Ohio, assignor to The B. F. Goodrich Co., New York City.

1,214,888. Tire casing mold. W. H. Burritt, St. Louis, Mo.

1,215,648. Tire forming apparatus. R. T. Griffith, assignor to The Miller Rubber Co.—both of Akron, Ohio.

1,215,680. Tire remover and replacer. A. N. Mason, Paducah, Ky.

1,215,828. Mold for making pneumatic tires. N. W. McLeod, St. Louis, Mo., assignor to American Motors Tire Co., Detroit, Mich.

1,215,910. Pressure cure vulcanizing apparatus. M. H. Clark, Hastings-upon-Hudson, N. Y., assignor to Boston Rubber Shoe Co., Boston, Mass.

1,215,934. Cross wrapping machine. O. A. Heckman, Akron, Ohio.

THE DOMINION OF CANADA.

172,649. Collapsible core. D. R. Hanawalt, Akron, Ohio.

172,829. Repair vulcanizer. A. B. Low, Denver, Colo.

172,830. Repair vulcanizer. A. B. Low, Denver, Colo.

THE UNITED KINGDOM.

12,943 (1915). Apparatus for removing air from rubber compound. W. J. Mellersch-Jackson, 28 Southampton Buildings, London. (Rubber Regenerating Co., New York City.)

13,139 (1915). Rubber sole laying machine. W. J. Mellersh-Jackson, 28 Southampton Buildings, London. (Boston Rubber Shoe Co., Boston, Mass.)

13,141 (1915). Rubber footwear stitching apparatus. W. J. Mellersh-Jackson, 28 Southampton Buildings, London. (Boston Rubber Shoe Co., Boston, Mass.)

13,682 (1915). Apparatus for curing and coagulating rubber latex. Rubber Curing Patents Syndicate, Norwich Union Buildings, St. James' street, London, and F. A. Byrne, 2 Ludgate Hill, Birmingham.

13,776 (1915). Bearings for the rollers of a rubber mill, etc. Naamlooze Vennootschap Deventer Ijzergieterij en Machine-Fabriek Voorhen, J. L. Nering Bogel & Co., and R. van Vloten, Deventer, Netherlands.

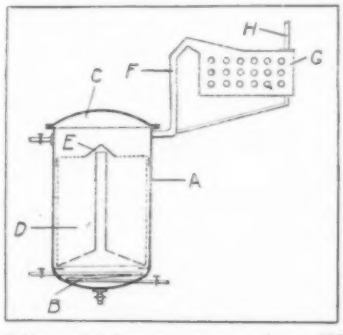
102,178. Apparatus for the manufacture of rubber and like tubing. H. Wade, 111 Hatton Garden, London. (B. B. Goldsmith, New York City.)

102,443. Clamp for use in securing leather or rubber soles to shoes by cement. H. Umbers, 29 Vernon street, and E. G. Dolman, 22 Ringley street—both in Harpurhey, Manchester.

PROCESS PATENTS.

FRENCH PROCESS FOR RECLAIMING BOTH RUBBER AND FABRIC.

METHOD for integrally removing rubber from the canvas of worn out pneumatic tires. This method permits the complete recovery of the rubber contained in the cloth which, entirely freed from rubber, may then be used again.



To obtain this result, the rubber scrap is treated with a dissolvent, for instance, xylol, subjected to powerful agitation while at the same time kept at a high temperature.

This agitation is produced by violent ebullition of the xylol in a vacuum at from 100 to 110 degrees, combined with circulation of the liquid obtained by an arrangement similar to that used in ordinary lye-washing machines.

The drawing shows a sectional elevation of the apparatus which consists of a digester *A* in the bottom of which is arranged a steam coil *B*. This heating can also be effected by means of the steam jacketed casing. Inside the digester, covered with a movable lid *C*, is a removable basket *D*, provided at the upper part and the center with caps *E*. In this basket is placed the material from which the rubber is to be removed after first being washed.

The upper part of the digester *A* communicates by means of a pipe *F* with a reflux condenser *G*, which returns to the digester the liquid resulting from the condensation of the steam. A tube *H* connects the condenser with an exhausting-pump.

After the cloth has been freed from rubber, it is placed in a washing-machine with cold xylol. This removes the particles of rubber still adhering to the cloth and also the resin and free sulphur.

The impure xylol resulting from this operation may be advantageously employed to swell the rubber in the preliminary treatment of the tires, always, however, after it has been filtered to free it from the particles of rubber. After the cloth has been rinsed in the washing machine, it is put into the basket *D* and this is placed into the digester *A* containing clean xylol.

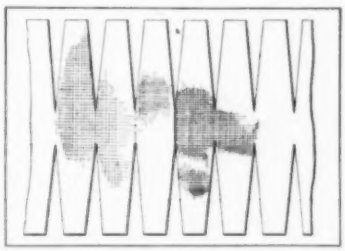
A vacuum is produced in the digester and heat to about 110 degrees is applied, producing violent ebullition. When the operation is judged to be concluded, the digester is emptied and a second operation begun.

All liquids with which cloth containing rubber in dissolution has been treated after the manner just explained, will still serve to effect the dissolution of rubber particles.

By the above method, the freeing of cloth from the rubber is almost integral; but to obtain a perfect result, a fresh quantity of xylol is added in the digester and the temperature is brought to about 150 degrees under pressure for a certain length of time. When the operation is concluded the cloth is replaced in the washing machine, is washed, rinsed and finally dried in a current of warm and inert gas. [H. Debauge. French patent No. 481,293 (July 20, 1915).]

A NOVEL TIRE FABRIC CONSTRUCTION.

Under present conditions tire building strips are cut on the bias from tire fabrics of standard widths, but the length of the strips is relatively short and limited to the width of the fabric. This invention provides a strip that may be cut lengthwise or transversely of the weave and in width somewhat greater than the transverse circumference of the tire. As seen in the illustration, the longitudinal edges are serrated and the free ends of the flaps are so spaced that when the strip is wound circumferentially around the core and the edges brought down against the sides, the edges of the flaps will meet. When the strip is cut longitudinally of the fabric one length may be used to construct an entire casing. [Robert M. Merriman, Akron, Ohio. United States patent No. 1,213,929.]



OTHER PROCESS PATENTS.

1,213,905. Process for vulcanizing plastics. C. J. Randall, Naugatuck, Conn., assignor to Boston Rubber Shoe Co., Boston, Mass.

1,215,275. Woven rubber fabric. A. H. Henderson, assignor to The Henderson Rubber Co.—both of Baltimore, Md.

THE DOMINION OF CANADA.

172,569. Method of making vulcanized rubber. Canadian Consolidated Rubber Co., Limited, Montreal, Quebec, assignee of C. D. Mason, Naugatuck, Conn.

172,679. Method of producing double texture fabrics. J. Meade, Stoughton, Mass.

THE UNITED KINGDOM.

12,944 (1915). Forming rubber articles by dipping. W. J. Mellersh-Jackson, 28 Southampton Buildings, London. (Rubber Regenerating Co., New York City.)

New Goods and Specialties.

BATHING CAPS FOR THE COMING SEASON.

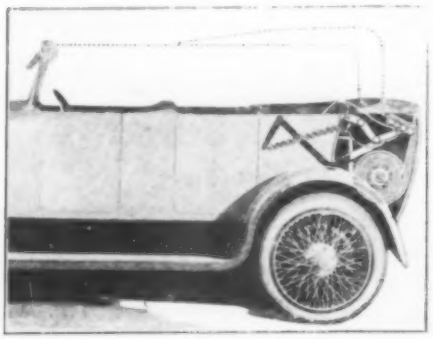
THE new bathing caps are more bewitching than ever and at the same time more serviceable. A practical and attractive cap for every bathing purpose is a white tailored diving cap which is decorated in various ways, the style shown having for its ornament a hand-painted bird in solid color or combinations—a white bird with blue painting, a black bird with red painting, a red bird with black painting, or a plain blue bird.

The all rubber sun hat shown in the second illustration affords protection for the face, is very becoming and consequently appealing to feminine buyers, yet preserves its original intent to protect the hair and ears while in the water, by means of a tightly fitting inner head-band. This cap is ornamented with a large button on top and a ribbon and buckle ornament at the side. It is furnished in black, red, blue and green, with trimming to harmonize.

Another brim hat with an inner head-band is made on strictly tailored lines, in black, red, blue and green, with a ribbon and bow in harmonizing colors. [The Faultless Rubber Co., Ashland, Ohio.]

THE "NO-MAN" TOP FOR AUTOMOBILES.

An engine-operated motor car top recently placed on the market may interest manufacturers of rubberized materials, since it can be made of any material used for car tops. This top works on the principle of an ordinary roller window shade and can be easily drawn up in place by the driver, without even stopping the car, or lowered and concealed in the specially designed compartment back of the tonneau where it is protected by a waterproof cover which gives the car a finished appearance.



Side curtains are also provided, working on the same principle, which may be pulled down and fastened at a moment's notice. The illustration shows the position of the "No-Man" top when rolled up in the tonneau. [Automatic Auto Top Co., Chicago, Illinois.]

BAREFOOT SANDAL WITH RUBBER SOLE.

The practical sandal type of footwear has grown increasingly popular for adults as well as children, and the well-built and attractive model here shown is being introduced at an opportune time. It is of high-grade construction on a specially designed last. The uppers are of pure white canvas and the soles of white rubber. This new sandal is supplied in women's, misses' and children's sizes. [Apsley Rubber Co., Hudson, Massachusetts.]

RAINCOAT FOR 1917.

The maker of this smart new model in ladies' raincoats maintains a corps of experts designers and living models to assist in producing superior creations in waterproof clothing. The coat here shown is semi-close fitting, single-breasted, with nine buttons, arranged in groups of three. Its special features are a Prussian collar, yoke and side pleats front and back, fancy cuffs and two side pockets with flaps, lending an air of style and individuality to the garment that makes it suitable for wearing over the daintiest gown, the full length cut giving complete protection. [The B. F. Goodrich Co., Akron, Ohio.]

THE "STIK-TITE" BACK CURTAIN WINDOW.

In the "Stik-Tite" window a fabric strip made of automobile rubber, or whatever fabric is used for the car top, is attached by rubber gum to the transparent celluloid forming the window proper. This window is applied to the back curtain of the car by the rubber gum and held absolutely secure, without stitching or fasteners of any kind, the whole process being handled in the same manner as putting a cold patch on an inner tube.

These windows are made in various shapes and sizes, to suit the different makes of cars. They weigh only three ounces, are neat in appearance, and it is claimed that they outwear several old-style windows and also protect and

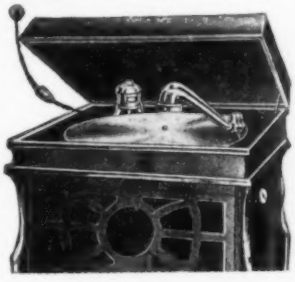
strengthen the curtain. [The Cincinnati Auto Specialty Co., Cincinnati, Ohio.]

"FLOSSY" DENTAL FLOSS HOLDER.

The use of dental floss is universally recommended by dentists and this newly invented floss holder, made of hard rubber, ebonite or French ivory, is claimed greatly to facilitate the operation of cleaning the interstices between the teeth where no toothbrush can reach, and to act as an economizer in the quantity of floss used. The floss container is held within the circle and the thread attached to each arm of the "Flossy" by being passed around the patented non-slip floss holding means with which the arms are provided. A thread-cutting device is so arranged that the used portion of silk is severed and discarded. In operating this simple little instrument the fingers need not enter the mouth and there are no metal parts to irritate the gums. Each outfit consists of one "Flossy" and a supply of medicated, perfumed, waxed silk dental floss contained in a sanitary rubberoid pocket case. [The Makers of Flossy, Evanston, Chicago, Illinois.]

VIBRATORY MASSAGE OUTFIT AND PHONOGRAPH MOTOR WITH SPONGE RUBBER.

Vibratory massage is a deservedly popular form of treatment for men after shaving or shampooing and for women in connection with facial and scalp treatments, and a new machine has recently been devised for this purpose whereby a complete motor apparatus may be placed on the back of the operator's hand. The convenience of this portable hand massage machine is readily apparent, since it weighs only 18 ounces and can easily be carried in the pocket, cord and all. It is held on the hand by two elastic straps, and a block of sponge rubber beneath each strap serves effectually to reduce the jar in the hand and arm of the operator. The machine is wound to operate on any lighting circuit, alternating or direct, 100 to 120 volts, 60 cycle or less, and a speed-regulating rheostat is included with each outfit.



At the end of the vertical motor shaft of the "Shelton" electric talking machine or phonograph motor, also shown, there is a soft rubber wheel which contacts with the edge of the table for driving the motor, in place of the usual hand-operated spring mechanism. [Shelton Electric Co., Fort Wayne, Indiana.]

"B. B. STYLO" FOUNTAIN PEN.

The stylographic pen here shown embodies a radical departure in stylographic construction and is claimed to be admirably adapted to the needs of the modern business public. The "B. B. Stylo" combines a stylographic point with a modern self-filling fountain pen equipped with fountain pen feed. The old-style inner air tube and leaky ink joint are replaced by the most desirable features of the standard fountain pen, such as a capillary saw for

carrying ink, a modern self-filling device in connection with the rubber sac, and proper feed ventilation. [Bird-Bill Pen Co., New York City.]

FISHING BROGUES AND SAND SHOES.

The stout rubber shoe and slipper, with buckle strap, shown in the accompanying illustration, appeal to the fisherman who knows that wet weather is fish weather, and who seeks a foot-covering suitable for the moist and marshy byways he must tread in pursuit of his finny prey. They are stout and serviceable, yet devoid of clumsiness, the studded soles preventing danger of slipping. These brogues are made entirely of rubber, or with leather half-soles if desired.

The rubber sand shoe for women, misses and children, also shown, is neatly bound, fastening with a strap and one button. The corrugated heel affords a safe foothold. These are supplied in black, brown, gray and white, with leather insoles if desired. [The North British Rubber Co., Limited, Edinburgh, Scotland.]

LIFE-PRESERVING OUTFIT.

The best diving suit material is utilized in the life preserving outfit here illustrated. It is made in the form of a union suit, covering the feet and hands also and being provided with bands of rubber about the wrists, neck and ankles. The suit is drawn on through an opening in the breast portion and the shoulder portion is drawn over the head, which passes through the soft rubber neck portion, made water-tight by a soft rubber strap. The sleeve of soft rubber forming the opening into the suit is then drawn together by the wearer and doubled, and a strap is wrapped around the folded sleeve, making it absolutely water-tight. Around the body of the suit are cork-filled pockets.

The shoes are weighted with five pounds of lead, to insure an upright position in the water, and the head and shoulders remain out of the water. The head mask, which is used in case of very rough weather to prevent the wearer from being smothered, is provided with ordinary transparent goggles and is tied around the neck with a flexible string.

The entire outfit can be put on in a minute's time, and it is claimed that the wearer will be kept perfectly warm and dry, and that even in case of puncture the suit will still prevent the wearer from sinking. [The Aud Co., Inc., Herndon, Virginia.]

ANTI-DRAFT SHIELD AND AUTO BUCKET.

The upper illustration shows a windshield cap made of 32-ounce enameled rubber duck, designed especially for Ford cars, to fit the space between the windshield and the top of the car through which drafts, rain and snow have access to the driver. The "Powers" Anti-Draft shield is furnished with strong, spring clips which fasten to the wind-shield and curtain fasteners with eyelets that attach it to the top of the car. This handy accessory is of good appearance and adds greatly to the comfort of motor driving.

SHOWING BUCKET IN USE

SHOWING BUCKET WHEN FOLDED

"Hinson's" textile auto bucket, also shown, is not merely collapsible but when not in use folds into a neat, flat package which can be put under the car seat or in the tool box and which can be unfolded instantly when required. It is made of khaki waterproofed duck, specially treated, and has a strap handle 15 inches long over the top. This bucket holds about 2 gallons. [The Powers Manufacturing Co., Waterloo, Iowa.]

RAIN VISION TRUCK SHIELD.

This sectional view of a rain vision shield specially designed to meet the requirements of commercial cars or trucks shows how the ¼-inch selected Pittsburgh plate glass is set in chanpel rubber, the frame being of ¾ by ⅞-inch steel tubing with ⅜ by ⅜-inch groove, finished in three coats of black enamel, baked on. The hinges are of the friction type, a slight turn of the wing nuts adjusting the upper fold to any angle desired for rain vision or ventilation. These shields are claimed to be practically indestructible and guaranteed not to rattle. They are supplied with or without the filler board in sizes ranging from 25 to 32 inches high and 40½ inches wide. [Banker Wind Shield Co., Pittsburgh, Pennsylvania.]

"RUBBER MILK" SPONGES.

The "rubber-milk" sponge, now being marketed in London under the trade name "Quala," is claimed to be a very different article from the rubber sponges of Continental European and American manufacture, which have from time to time appeared on the market. The "Quala" is made by a wet process direct from the "rubber milk" or latex. It resembles the natural sponge in appearance, and unlike the red rubber sponges, it swells and grows soft in water. Over the natural sponge it is said to have the advantage that it does not clog nor get foul with soap. This "rubber-milk" sponge is to be extensively advertised, and instructions furnished with each sponge advise purchasers before putting the sponge into use, to soak it in hot water for half an hour and then soap it thoroughly and rinse. This treatment restores the "Quala" to its natural color and normal size, which is about one-half larger than in its dry, packed state. The sponge should afterwards be kept moist and should not be exposed to sunlight for any length of time. This "rubber-milk" sponge is made at Brentford, England. [Rubber Sponges, Limited, London, England.]

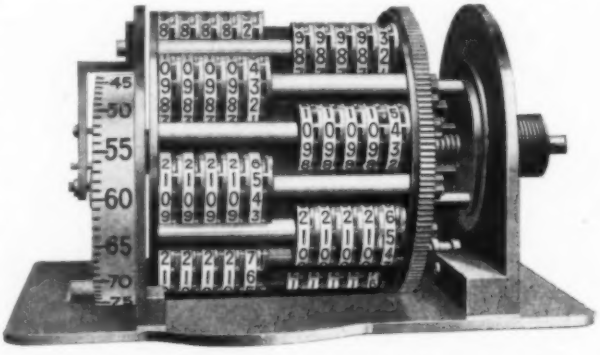
LIFE PRESERVER FOR ADULT AND CHILD.

The inventor's hand will be seen on the boy's shoulder in the accompanying illustration of a life preserver large enough to admit an adult and child. The boat-shaped frame is covered with waterproof material which is extended in the proper places for the arms and legs. The life preserver is further provided with cork floats, a window for light and observation, and air intake tubes. When closed, it locks and the wearer floats on his back, riding the waves and completely protected from cold and water. [Nick K. Remos, Lansing, Michigan.]

THE HAMILTON MULTOMETER.

A recording device that accurately indicates the separate mileage of each tire in service and also of the two spare tires is one of the newest accessories to claim the motorist's attention. Moreover, in case of puncture, blowout, or tire replacement, the registering device may be disconnected and the mileage of that particular tire recorded.

It is a speed indicator as well, and indicates trip or season mileage. It also records gasolene mileage (for the season or trip) with mathematical accuracy, and indicates the necessary mechanical adjustments, oiling and cleaning requirements, at each 500 and 1,000-mile period.



The Multometer is an accurate instrument and is said to record 13 separate readings that contribute to the economical and efficient operation of the car.

It is operated from a single flexible shaft and mounted in a manner similar to the standard speedometer equipment. The control is exceedingly simple:

Turn the movable dial ring indicated in the illustration so that the reading desired shows on the face of the ring directly opposite the setting knob at the right. Turning the dial ring to the point marked "trip" indication shows mile by mile on the dial. Turn it to the point marked "total" and the total mileage for the season shows up instantly. Turn it to the point indicating any tire on which you desire reading and you get the totals immediately. [The Hamilton Corporation, Lancaster, Pennsylvania.]

The Editor's Book Table.

EXPORT TRADE DIRECTORY. BY B. OLNEY HOUGH. JOHNSTON Export Publishing Co., New York City. [540 pages, cloth, $5.]

THIS important trade directory comes to us much enlarged over the previous number, containing as it does a gain of more than 50 per cent in many of its principal lists. Export merchants in New York are given to the number of 1,295 in place of less than 800 in the last edition and the San Francisco list shows a gain of more than 20 per cent. The book gives lists of the principal export merchants of the United States, export agents and brokers, the leading bankers engaged in foreign exchange business, marine insurance companies, foreign freight forwarders, the steamship service to foreign ports, consuls of foreign countries in the United States and our consuls in foreign countries, associations for promoting export trade, and several classified lists for quick reference as to goods manufactured or markets cultivated. The book is compiled by B. Olney Hough, editor of the "American Exporter."

COMMERCIAL WOODS OF THE PHILIPPINES: THEIR PREPARATION and Uses. By E. E. Schneider, Bureau of Forestry, Manila, Philippine Islands. [8vo, 274 pages, paper covers, $1.00.]

This work is intended primarily to furnish woodworkers and users with authentic information concerning the woods of our island possessions in the Far East. There is a concise account of the forests, with a description of each species of wood, its physical and mechanical properties, and the different purposes for which it can be utilized. Quite full and untechnical directions are given for the identification of the trees, and of the wood when cut into lumber. More than half the book is devoted to detailed descriptions of the 360 Philippine woods, with notes on their mechanical properties and workability. Each is given its botanical, and its local name or names, its uses, and approximate prices. It is a book of practical use to those interested in the building and wood-working trades.

THE INDUSTRIAL AND SOCIAL IMPORTANCE OF FORESTRY IN China. By Forsythe Sherfesee, Ministry of Agriculture and Commerce, Peking, China. [Small 8vo, 26 pages.]

Forsythe Sherfesee, Adviser in Forestry to the Agricultural Department of the Chinese Republic, claims in this paper, which is reprinted from "The Chinese Social and Political Review," that the chief handicap in China's industrial advance is the lack of forests, and consequent scarcity of wood for building, manufacturing purposes and fuel. No other modern country has been so denuded of forests, through heavy rainfalls washing away the soil, and he predicts a condition similar to the Sahara, unless forests are planted. Millions of acres of public lands, unsuited to agriculture but fully capable of supporting forest growth, lie idle and unproductive. To overcome this state of affairs, there was created last year the first Chinese National Forest Service, and this body is inaugurating a comprehensive plan for reforestation in many sections of the country.

FATIGUE STUDY. BY FRANK B. AND LILLIAN M. GILBRETH. Sturgis & Walton Co., New York City. [Small 8vo, 159 pages, illustrated. Price, $1.50.]

The twentieth century manufacturer aims to find the best workers, and to secure from them their best work. To accomplish the latter is the object of the study which is here described. Every worker, whatever his task, can do better work, and labor effectively for a longer time, if conditions are such that no unnecessary fatigue is induced. This book is devoted to such study. It contains a large amount of practical matter, the result of scientific investigation of two experts, with many definite suggestions and reports of plans which have been worked out in the investigation for eliminating unnecessary fatigue. The book contains a large number of illustrations from photographs taken at the plant of the New England Butt Co., where these studies have been put to practical use and the results have proven their value. Especially interesting are some of the studies of false motion, where a small electric light has been placed upon the hand and then a photograph made, tracing the motions of the hand as recorded on the photographic plate. These cyclegraphs and chronographs are worthy of special study. Many other special inventions which have been made by the authors and put to practical use are pictorially recorded, as well as some motion pictures taken each five-hundredth of a minute for the purpose of studying a means of eradicating false motions and fatigue. This book aims to present the problem of fatigue in the industries in its simplest form, and to outline its practical solution.

MOTOR TRUCKS OF AMERICA. VOL. 5. THE B. F. GOODRICH Co., Akron, Ohio. [164 pages, paper covers.]

The truck tire department of The B. F. Goodrich Co., Akron, Ohio, has issued Volume 5 of its excellent work giving full details and specifications of the motor trucks manufactured in this country. Each truck is pictured in an excellent half-tone, and the various specifications as to model, capacity, price, the dimensions of the motor, the wheelbase, and the tires, as well as every other item regarding external and internal construction. More than 120 different trucks are thus fully described. There is also a finely illustrated article entitled "Lengthening the Life of the Motor Truck" and other information of value to every owner, user and repairer of such vehicles. At the end of the book are bound in, four printed and directed postcards which may be detached and sent, requesting further publications of that company.

NEW TRADE PUBLICATIONS.

THE DAVOL RUBBER CO., Providence, Rhode Island, is distributing a very neat little catalog and price-list of fountain syringes, water bottles and similar goods, handsomely printed, with the various lines pictured in the vivid colors of the goods themselves, the illustrations occupying the right-hand pages, the description and prices on the pages opposite. It is at once compact and comprehensive, and should bring business.

* * *

The Thermoid Rubber Co., Trenton, New Jersey, sends us a finely printed catalog of its automobile products, including tires, inner tubes, brake linings of various types, clutch facings and disks, fan belts, bumpers, pedal pads, pump tubing, and various styles and qualities of hose, besides miscellaneous accessories for automobiles. Half-tone illustrations are profusely scattered through the book, giving excellent ideas of the goods listed. A bird's-eye view of the plant decorates the title page.

* * *

"Science Progress," the well-known English quarterly, (John Murray, Albermarle street, London) has sent this office the July 16, 1916, number, which contains an able and interesting "Historical Sketch of the Chemistry of Rubber," by S. C. Bradford, B.Sc., of the Science Museum, South Kensington, London. In less than a dozen octavo pages, Professor Bradford has collected a host of facts, historical and chemical, including those regarding the successful production of synthetic rubber, reviewing succinctly the experiments and researches from Hancock, in the early '40s, to Matthews and Bayer during the present decade.

* * *

The Fisher Governor Co., Marshalltown, Iowa, sends out a fine line of "bulletins" which are arranged to form, in the self binder furnished, a full catalog of the pump governors, reducing valves, exhaust and relief valves, pressure regulating devices, steam traps and similar mechanisms for use in indus-

trial establishments. These bulletins are finely printed, illustrated with simple diagrams and excellent half-tones, and the descriptive matter clear and concise. In the list of large users of the Fisher specialties are a number of leading rubber manufacturing concerns whose names are familiar to our readers.

* * *

William H. Scheel, 159 Maiden Lane, New York City, importer and distributer of rubber substitutes, rubber workers' supplies, compounding ingredients for rubber and other trades, has issued a buyer's list covering his complete line. Purchasing agents will be supplied with as many copies as they require.

* * *

The Apsley Rubber Co., Hudson, Massachusetts, is sending out a style book which within its 80 pages shows well-executed half-tones of practically every rubber this company manufactures. The footwear which is other than black is printed in its appropriate color. Besides the side views, the shapes of the soles are given and the description of each shows its special features. The cover is printed in blue and gold and, typographically, the pamphlet is most commendable.

Distributed with this is a smaller pamphlet giving the packing schedule, which shows the number of pairs of each size in 12 and 24-pair cases.

THE WORLD'S RUBBER POSITION.

The annual chart showing in graphic form the World's Rubber Position as published by W. H. Rickinson & Son, London, shows in diagram many important facts regarding rubber production, prices and distribution. The wonderful advance in the total production, and the increased yield of plantation rubber and the average prices show the most sensational lines on the chart, but the other diagrams are also interesting. The statistics of plantation rubber are given in columns at the right and left of the chart. They show number of acres in bearing, yield in tons and price per pound. The great expansion of American consumption of rubber, and comparatively small increase in the retention of rubber in Great Britain are especially worthy of attention. In all, the chart is well worth a place in every rubber merchant's and manufacturer's office. This chart is reproduced in greatly reduced form on another page in this issue.

CALENDARS AND SOUVENIRS.

Although the first of the year is the usual time for the distribution of calendars and other souvenirs for advertising purposes, THE INDIA RUBBER WORLD has received quite a number during last month, which are hereby acknowledged.

The Industrial Chemical Co., New York City, has sent out a very useful little affair which combines an 8-inch rule, a calendar for the year and a signature blotter. This is in enameled white metal with several layers of blotting paper on the under side, while the announcement of the company occupies a space between the two groups of six months each giving the calendar for the year.

Those smokers will be delighted who receive from Katzenbach & Bullock Co., New York City, a combined match box, cigar rest and ash tray of bronze finish with a holder of the proper size to contain a box of matches. The latter has upon either side an advertisement of the lines of goods carried by this well-known chemical firm.

One of the most striking calendars received is that of the Buffalo Foundry & Machine Co., Buffalo, New York, which is in the form of a handsome reproduction of Thomas Moran's celebrated painting, "Venice the Golden." The brilliant coloring of this picture and its fine reproduction make it an ornament worthy to adorn any office or home.

For practical advertising F. E. Myers & Bro., Ashland, Ohio, must be commended. Their calendar sheet contains engravings of several hundred varieties of pumps and miscellaneous machinery in which this firm specializes. The calendar is small and neat and occupies the center of the sheet. At the top is a colored lithograph of a country scene, perhaps a Jack and Jill, the latter using a Myers pump most effectively.

The Firestone Tire & Rubber Co., Akron, Ohio, embellishes its new calendar with a ten-color print of a handsome girl of the American type. The original, the work of Earl Christy, is owned by the Firestone company. The reproduction is a fine example of art printing.

Obalsky & Sweeney, Inc., crude rubber importer, New York City, has distributed to the trade a useful and ornamental souvenir. It is a red leather desk pad of convenient shape for recording memoranda, the paper being supplied from a removable roll enclosed in the top of the pad.

RUBBER TRADE INQUIRIES.

THE inquiries that follow have already been answered; nevertheless they are of interest, not only in showing the needs of the trade, but because of the possibility that additional information may be furnished by those who read them. The editor is therefore glad to have those interested communicate with him.

[274.] A correspondent wishes to obtain a small skiving machine for use in making patches.

[275.] Manufacturers of small laboratory roller mills for working up samples of rubber are sought.

[276.] Names and addresses of concerns supplying rubber seed oil have been requested.

[277.] An inquiry has been received for machinery used in the manufacture of tires and inner tubes for automobiles, motorcycles and bicycles.

[278.] A correspondent is interested in the machinery used in repairing tires and in making rubber heels and tennis balls.

[279.] Information is desired regarding zinc substitutes.

[280.] An inquiry has been received for rubber respirators.

[281.] Names of makers of machinery to cut sheet rubber into threads for elastic textiles have been requested.

[282.] Names of manufacturers of rubber pencil tips are desired.

[283.] Full information regarding tire vulcanizing is requested.

[284.] An inquiry has been received for brass hot water bottle stoppers.

[285.] A machine for cutting rubber thread is sought.

TRADE OPPORTUNITIES FROM CONSULAR REPORTS.

A firm in Bolivia wishes to be put in touch with American manufacturers and exporters of cheap rubber hair ornaments. Report No. 23,627.

Exclusive agency for the sale of tires is desired by an engineer in Switzerland. Report No. 23,656.

A firm in Bolivia wishes to receive catalogs and full information from American manufacturers and exporters of rubber combs. Report No. 23,659.

Representation of American manufacturers and exporters of pneumatic tires is desired by an applicant in Spain. Report No. 23,666.

Agency is desired in Australia for the sale of elastic fittings for suspenders, etc. Report No. 23,682.

A man in Switzerland desires to purchase erasers and to secure an agency for their sale. Report No. 23,684.

A firm in British East Africa is in the market for canvas and leather shoes with composition and chrome soles. Report No. 23,699.

An applicant in Spain desires to purchase pneumatic tires and automobile supplies. Report No. 23,729.

An Australian business man now in the United States wishes to purchase balata belting. Report No. 23,750.

The Obituary Record.

RICHARD S. SATTERLEE, vice-president of the Habirshaw Electric Cable Co., Inc., of New York City, died at his home in that city February 15, aged 56 years.

Captain Satterlee was born in New York City, June 6, 1860, son of the late George B. and Sarah Satterlee. He was educated at St. Paul's School in Concord, New Hampshire, and at Holbrook's Military Academy, Ossining, New York, afterwards studying at the College of Physicians and Surgeons, New York City, where, however, he did not complete his course. He served in the Seventh Regiment, New York National Guards, and for several years was engaged in cattle raising on a ranch in Wyoming. After his return to New York City he entered the real estate business and was appointed Deputy Tax Commissioner by Mayor Strong, serving four years.

CAPT. R. S. SATTERLEE.

He went around the Horn in a sailing vessel in 1898 and on arriving in San Francisco, California, he heard of the declaration of war with Spain and immediately joined the First New York Volunteers and started for the Philippines. Typhoid fever broke out and the regiment got no further than Honolulu. Later he received a commission as First Lieutenant in the Twelfth New York Infantry, and saw service with this regiment in Cuba. After the Spanish war he became connected with the Habirshaw Wire Co., in which his brother, Hon. Herbert L. Satterlee, was interested. He was president of the company at the time it became associated with the Electric Cable Co., and the name was changed to the Habirshaw Electric Cable Co., Inc., Mr. Satterlee becoming vice-president, a position he retained up to the time of his death.

At the time when it seemed probable that this country would have war with Mexico, Mr. Satterlee offered his services to the State, although he was past military age, and his offer being accepted, he was appointed Captain of Ordnance and attached to the Division Staff.

On the 10th of last month, in company with Major L. Reagan, Division Adjutant, Captain Satterlee began a tour of inspection of the aqueduct at points where guards had been stationed. The long exposure to severe weather caused a sudden illness, which resulted in his death.

Captain Satterlee is survived by his widow, his mother, a sister and a brother.

A WELL-KNOWN RUBBER RECLAIMER.

Samuel Wright, prominently connected with the crude and reclaimed rubber business, died of pneumonia January 18 at his home in Yonkers, New York.

He was born in Conshohocken, Pennsylvania, June 22, 1875, and after graduation from the Academy of Natural Sciences, Philadelphia, became assistant secretary of the J. Elwood Lee Co., Conshohocken, and in 1911, when the Lee Tire & Rubber Co. was formed, was appointed secretary, resigning about a year ago to become associated with the Philadelphia Rubber Works Co. He was also treasurer and general manager of the Acushnet Process Co., Inc., of New York City, a corporation formed to handle the New York City business of the Acushnet Process Co., of New Bedford, Massachusetts.

Mr. Wright was a thirty-second degree Mason, a Shriner, and a member of the Loyal Legion, the Rubber Association of America, and the Merion Cricket Club of Philadelphia.

HEAD OF THE GERMAN RUBBER MANUFACTURERS.

The death is announced of Louis Hoff, chairman of the Central-Verein Deutscher Kautsckuk-Waren Fabriken (German Rubber Manufacturers' Association) since 1904, and general director of the United Harburg-Vienna India Rubber Works. He was also prominently associated with the Kolonial-Wirtschaftlichen Kommittee.

LONG PROMINENT IN CRUDE RUBBER TRADE.

Herman Reimers, well known in the crude rubber trade, died at his home, "The Elms," Spaniards' Road, Hampstead Heath, London, England, February 11, in his sixtieth year.

H. REIMERS.

Mr. Reimers was born in Bremen, Germany, and when a young man came to this country in 1876 and was connected with the crude rubber house of Charles Loewenthal & Co., later becoming a member of the firm. He represented the company in Boston, Massachusetts, for several years and when the partnership expired by limitation, December 31, 1891, a new partnership of Reimers & Meyer was formed, afterwards becoming Reimers & Co. In 1902 this firm was succeeded by Poel & Arnold. Mr. Reimers remained out of business for about six years, during which time he made his home at Honnef, Germany, but traveled extensively in Europe, and then he became a partner in the parent house of Heilburt, Symons & Co., London, England, where he remained until the time of his death. He was at one time chairman of the board of the Anglo-French Mercantile and Finance Corporation, Limited, a £1,000,000 corporation for financing, buying and selling rubber plantations, and was director in several rubber plantation companies in the Far East.

Mr. Reimers was of strong personality, a man of exuberant spirits and tremendous vitality. It is said that he had several times been mistaken for Sandow, the wrestler, both on account of his physical build and facial resemblance. He visited the

Amazon rubber regions in 1894, where he tapped trees, gathered latex and smoked the rubber, and he wrote an entertaining account of this which appeared in THE INDIA RUBBER WORLD, June 15, 1894. He had a large acquaintance and a host of friends in the rubber trade, not only in this country but in Europe.

A LEADING RUBBER GOODS DISTRIBUTER.

Warren M. Salisbury, one of the original incorporators of W. H. Salisbury & Co., the well-known rubber distributing concern, Chicago, Illinois, and its first president, died at the Presbyterian Hospital in that city February 5 at the age of 58. The business dates from 1855, and was named for his father, W. H. Salisbury, who was its active head from 1874 until his death in 1902. The business was incorporated in 1904, and is one of the leading houses in the west for the distribution of mechanical rubber goods and leather belting.

Warren M. Salisbury was born in Augusta, Georgia, and came to Chicago in 1877. His entire business life was spent with the above named company, but he was also a director in the W. W. Kimball Piano Co. and the Rockwood Sprinkler Co. of Chicago. He is survived by his widow, and one son, Kimball M. Salisbury.

PROMINENT IN THE TIRE FABRIC INDUSTRY.

William B. Fittz, formerly general manager and secretary of the Connecticut Mills Co., Danielson, Connecticut, died at Brookline, Massachusetts, February 12, aged nearly 61 years.

Mr. Fittz was identified with the textile industry during his entire business life. He was superintendent of the West Boylston Manufacturing Co. at Oakdale, Massachusetts, and it was under his supervision that the entire plant was transferred to Easthampton, Massachusetts, in record time. In October, 1911, he started the Connecticut Mills Co. enterprise at Danielson to manufacture tire fabric. Under his management, the little six-loom mill grew to its present proportions. Meanwhile, he established the Canadian Connecticut Cotton Mills, Limited, at Sherbrooke, Quebec, to supply the Canadian demand for the company's product. Mr. Fittz resigned as secretary and general manager in October, 1914, and devoted his time to travel.

His first wife died seven years ago. He married, in June, 1916, Miss Bertha Field, who survives him. The wedding trip was to Japan and other countries of the Orient. Returning to America last October, he resided in Brookline, Massachusetts.

A FORMER RUBBER STAMP MANUFACTURER.

James K. Stewart, for many years a prominent manufacturer of rubber stamps in Cincinnati, Ohio, died suddenly at his home in that city on January 26. He was an active and energetic member of the International Stamp Manufacturers' Association, and was a member of its board of directors. Through his efforts the Cincinnati Stamp Club was formed, and he was elected president, which position he resigned when he withdrew from the stamp business. He was engaged in the stationery trade at the time of his death.

FIRESTONE SALES MANAGER.

F. C. Blanchard, sales manager to motor car makers, of the Firestone Tire & Rubber Co., Akron, Ohio, died at the City Hospital there February 12, following an operation. Mr. Blanchard was born in Akron and his business career began with the Whitman & Barnes Manufacturing Co. at the age of 17. Developing rapidly, he became an efficient salesman and about six years ago joined the Firestone organization as assistant sales manager, to take special charge of the sales to manufacturers, and for one year, during the absence of R. J. Firestone, he acted as general sales manager.

Mr. Blanchard had a wide acquaintance among the automobile manufacturers throughout the country and was very popular, having hundreds of friends in the industry. He was a member of the Portage Country Club, the Akron City Club and the Rotary Club. He leaves a widow and two children.

JUDICIAL DECISIONS.

CATARACT RUBBER CO., EMERSON ET AL. V. CASTOR ET AL. In the matter of the bankruptcy of the Cataract Rubber Co., which maintains and operates a plant for the manufacture of rubber tires at Wooster, Ohio, Robert S. Emerson, as trustee in bankruptcy and receiver of the bankrupt and another, instituted proceedings for the recovery of property against which Charles A. Castor and others asserted liens and priorities, and appealed from a decree upholding the liens. The decree was reversed and remanded, with directions for modification. [The Federal Reporter, Vol. 236, page 31.]

SLAMA TIRE PROTECTOR CO. V. RITCHIE ET AL. The action by the company against J. A. Ritchie and another, partners as Ritchie & Heriot, was for breach of contract. The plaintiff's appeal from an adverse judgment was affirmed. [The Pacific Reporter, Vol. 161, page 25.]

THERMOID RUBBER CO. V. BRICTSON. In an action of the Thermoid Rubber Company against O. A. Brictson, trading under the name of the Brictson Manufacturing Co., the plaintiff appealed from an order overruling the demurrer to the defendant's counter claim. The appeal was perfected July 7, 1916. No briefs had been filed in the Supreme Court of South Dakota, nor had any stipulation been filed, extending the time for such filing. The appeals were therefore deemed abandoned, and the order appealed from was affirmed. [The Northern Reporter, Vol. 159, page 872.]

UNITED STATES RUBBER CO. V. BERNARD SILVERSTEIN. The action was brought to recover a guaranty for the payment of goods sold to the defendant's sons which the court pronounced ambiguous, being based upon grammatical errors. The motion for a new trial was denied. [The New York Supplement, Vol. 161, No. 3, page 369.]

DAYLIGHT SAVING.

THE movement to turn all clocks in the country one hour ahead of the present standard time during the summer months has taken on great impetus as a result of the recent National Daylight Saving Convention in New York City and President Wilson's endorsement of the plan. The matter was also under consideration at the fifth annual meeting of the Chamber of Commerce of the United States at Washington, District of Columbia, a special committee having recommended congressional action to authorize the change throughout the year. While the directors agree that the plan should be adopted during the summer months, they are not prepared to advocate its adoption for the whole year, and the matter will probably be referred to the membership through a mail referendum.

American manufacturers of rubber as well as other goods are fully alive to the manifest physiological, economic and social advantages of the daylight saving plan, as demonstrated last summer in Germany, Austria, France, Italy, Portugal, Holland, Denmark, Norway and Sweden, where clocks were uniformly turned forward. Progressive men among them believe the project offers a measure of relief particularly desirable during the present feverish activity in most factories of the country. No argument is needed to the effect that a cool morning working hour, instead of a hot one in the afternoon, together with increased daylight during the hours of greatest fatigue, will increase opportunities for beneficial recreation with consequent greater personal efficiency, will reduce industrial accidents, lessen the tuberculosis tendency and reduce eye strain. The advantages of having the transportation "rush" hour occur before nightfall are apparent, and the total direct savings in fuel for artificial light would be tremendous.

Interesting Letters from Our Readers.

RUBBER RECLAIMING BECOMING A GREAT INDUSTRY.

TO THE EDITOR OF THE INDIA RUBBER WORLD:

DEAR SIR—It does the heart of a practical rubber technologist good to note the progress in reclaiming of old rubber, the enhanced value of reclaimed rubber, due to the scarcity of crude rubber, and the extended use of the better grades of reclaimed rubber in compounding has acted as a stimulant upon the reclaiming industry. An extensive business is being done in sorting and trimming all grades of scrap rubber, and specialization is becoming a custom among reclaimers. Two reclaimers, for instance, are making special stocks for tire treading and shoe soling. Their aim is to supply to the small manufacturer, who is without an expert rubber technologist or laboratory facilities, a compounded stock that will supply his needs.

The demand for good grades of soling stock was never so great because of the high price and often the poor quality of the leather used for this purpose. The rubber sole, being durable and waterproof, is rapidly superseding the leather sole on the score of economy and efficiency. The "non-skid," noiseless characteristics of the rubber sole also appeal to the walking public. Aside from the several qualities enumerated, there is another one whose importance is underestimated because its value is not well known. This is the beneficial physiological action that the rubber heel and sole exert upon the nervous system through its non-concussive effect upon the spinal column. By the use of several new compounding ingredients made available by the strides of commerce and manufacture, the ordinary rubber soling compound can be improved to a certain degree.

Two new reclaiming factories, the Phoenix in Akron and another in Chicago, will begin operations early this year. Many of the larger rubber manufacturing firms are now reclaiming their own scrap and several others are preparing to do so. The war has contributed a valuable reclaiming agent. Several new reclaiming patents have been issued and secret processes are being exploited.

Nothing very novel in reclaiming methods has become common knowledge, however. The big idea is circumvention. In reclaiming, the important steps are defabricizing, plasticizing and utilizing, all well-known methods. A close examination of the 109 United States patents, and almost as many foreign ones, covering "processes for restoring old rubber" indicate that it would be a difficult matter to work out an original idea on the subject. However, there are still a few open links in the chain.

A study of these patents shows that very little has been done in saving the by-products of reclaiming. Just why valuable by-products should be dissipated can be explained only by the fact that in the past the profits of the industry have been so large that there has been no incentive toward conservation. In the future it is doubtful if reclaiming will pay such high dividends, and economy in buying, manufacturing and selling will characterize the methods of successful reclaimers. Attention will then be given to the by-products that heretofore have been thrown away.

C. P. F.

Cleveland, Ohio, January 30, 1917.

GROWING RAW MATERIALS IN THE AMERICAS.

TO THE EDITOR OF THE INDIA RUBBER WORLD:

DEAR SIR—It does the heart of a practical rubber technologist good to note that leading rubber manufacturers are at last manifesting active interest in the proposition to provide within our own borders the raw materials essential to the rubber industry. Recently we have heard much about preparedness, and the international situation today emphasizes the reasons for it as never before. In our own line, substantial progress has been made in Imperial Valley, California, toward providing the long-staple cotton necessary for tire fabrics. It has been demonstrated that we can, if need be, maintain that industry without cotton imports. But America in the future must be prepared to produce its own rubber.

Heretofore commerce has followed the flag. In the case of rubber production the flag must follow the plow. Our land-grant colleges should offer special instruction in tropical agriculture and make rubber culture a requirement. The Americas have the soil as well as the conditions, and though handicapped by the cheap labor of the Orient, American methods, aided by American machinery, will be successful.

J. C. Harvey, that pioneer in rubber culture, who gathered from the many corners of the earth the various kinds of rubber-bearing plants and grew and studied them on his Mexican *hacienda*, had in his collection the *Hevea*. Specimens of this tree planted and grown under poor conditions had made, a few years ago, as good an appearance as many of the Malayan representatives did in their early life. Had these trees been given the benefit of cultivation and time, what might have been the result? Harvey's work, while left unfinished, was not lost. Who will take up the thread?

Another matter not entirely devoid of interest is the possibility, though remote, of the production of crude rubber in the Temperate Zone. The milkweed idea is not wholly deceased, and during 1917 a small-scale experiment to determine the exact economic value of the *Asclepias* in the production of rubber, fiber and oil (from seed) will be tried out in the fertile soil of the Big Miami Valley where the plant reaches its maximum growth. During the past season Willis Knickerbocker, New Lenox, Illinois, has experimented with the fruit of the Osage orange. He has tried waterproofing cloth with Osage "orangeade" and I have seen worse results. In Arizona the ocotillo (*Fouquieria splendens*) is being extracted for the wax, which is said to be a good substitute for chewing-gum. This plant under suitable treatment should yield another product valuable as a compounding ingredient.

A local rubber concern has acquired land in Salt River Valley, Arizona, and will grow its own supply of cotton there. In connection with this enterprise the conditions are ideal to test the Lloyd system of growing guayule. The rabbit-weed or pingue (*Picradenia floribunda*) would probably give even better results.

Writing about fibers for auto tires leads to the suggestion of the use of some of our uncommon native fibers. Many years ago, the East Indian *Abutilon* was introduced into the United States, and has now become a troublesome weed throughout the Central States. The plant produces a strong fiber. Our moraceous wild Indian hemp (*Cannabis sativa*) produces a good fiber as well as rubber. In the Pecos district of western Texas thousands of acres are overgrown with the Spanish bayonet. This plant has an excellent fiber in its leaf and a valuable glucoside in its root.

Altogether there are still several lines of considerable promise worthy of investigation and experiment at the hands of progressive, forehanded rubber manufacturers.

PROGRESSIVE.

Akron, Ohio, February 15, 1917.

Housing the Connecticut Mills Employes

By John Barnard, Architect.

ANYBODY who has seen a typical cotton mill town with its unsightly rows of barn-like tenements will be pleasantly surprised by a visit to Danielson, Connecticut. Opposite the growing plant of the Connecticut Mills Co., weaver of tire fabrics, in a rolling tract of land 150 acres in extent and containing a picturesque little pond, is springing up a model village of comfortable, attractive cottages for the operatives. Winding streets are being laid out, landscape features determined, and when the development is complete, extensive lawns, shade trees, flower and vegetable gardens will complete the picture and combine all the benefits of country living with such conveniences of the city as electric lights and sanitary plumbing.

The housing movement was slow to reach cotton operatives because of the long established conviction that crowded tenements sufficed. But R. J. Caldwell, of New York City, thought differently, and the work now under way around the mills at Danielson, and at Sherbrooke, Quebec, as well as that contemplated at Taunton, Massachusetts, has acted as an incentive to others who are falling in line. Mr. Caldwell believed that because cotton operatives had always been obliged to hive together was no reason to suppose they did not long for modern conveniences. Moreover, the result of his experiment has proved that they do desire and appreciate better conditions, will not intentionally abuse them, are amenable to suggestions for a higher standard of living, and that greater efficiency and permanency of employment are the results.

A PLEASING TWO-FAMILY HOUSE FOR THE CONNECTICUT MILLS CO.

Mill officials and citizens of Danielson financed the project by organizing the Danielson Construction Co. and subscribing a working capital of $40,000. The houses are erected by local builders, rented by the mill for a period of three years at 10 per cent of their cost, and then sub-let to employes and the rental of about $4 weekly deducted from the pay envelope of the tenant. Ordinarily this rental is easily within the reach of cotton mill operatives, who are now receiving the highest wages in the history of the industry. Moreover, there are often several wage earners in a family. In special instances, however, when for some adequate reason the amount is more than a deserving employe can afford to pay, the mill will assume part of the annual rental up to $25.

Many operatives wish to own their own homes, and to encourage this tendency toward permanence and better citizenship, N. D. Prince, vice-president of the Windham County National Bank, rose to the occasion and arranged not only to have his bank lend any reasonable sum to the construction company, but to assist individual financing as well. Thus the bank takes a 70 per cent first mortgage provided the operative can furnish the other 30 per cent himself. When a deserving person cannot do this, yet desires to buy a home, the mill advances it on a second mortgage, deducting the amount proportionately from the tenant's pay envelope until the second mortgage is disposed of, and continuing thereafter to make such equitable deductions as circumstances permit for the payment of the first mortgage.

Several four-family houses were put up at the outset as receiving stations for new help as recruited, but later operations have been principally in single houses with a few of the two-family semi-detached type, most of them intended for sale to operatives. Each single house is about 25 feet square with four rooms of ample size on each floor, a good porch, attic and cellar. A bathroom with open plumbing, hot and cold water in the kitchen and bathroom, and electric lights throughout are the principal features, however. Floors and wood trim are of Georgian pine with inside walls of rough plaster oil-painted in warm tints, which is more sanitary than wall paper and more easily repaired.

William H. Cox, the architect, has provided several floor plans, to which various exteriors can be applied. Only four or five similar houses will be erected, and these are to be so scattered over the entire development and so varied by the use of shingles, clapboards, siding or stucco for the exterior walls, as to avoid any appearance of duplication. Thus far all have been of wood in the Colonial spirit, but several of the English cottage type are soon to be erected. The cost is about $1,900 each, or $3,600 for the two-family houses.

PICTURESQUE TYPES OF SINGLE HOUSES AT DANIELSON, CONNECTICUT; A GAMBREL-ROOF LEAN-TO AND A CAPE COD FARMHOUSE.

News of the American Rubber Trade.

THE FISK RUBBER CO. CONFERENCE.

A FOUR-DAY conference of district and branch managers of The Fisk Rubber Co., Chicopee Falls, Massachusetts, held during the past month, was not only the first gathering of all the executive heads of this company, but also in the nature of a dedication of the enlarged model industrial plant which houses the manufacturing and administrative departments.

Vice-President E. H. Broadwell welcomed the delegates at the factory, and during the session addresses were made by the following department heads: F. H. Ayers, sales manager; J. D. Anderson, factory manager; E. M. Bogardus, comptroller; George L. Sullivan, advertising manager; Charles H. Gage, of the sales department; Leon H. Southmayd, in charge of the bicycle tires and tire sundries department; George B. Hendrick, publicity manager; W. B. Keiser, credit manager; R. B. McGaw, assistant treasurer; W. H. Bogardus, manager of the branch auditing department; C. I. Bradley, manager of the service department; William J. Lambe, Detroit district manager, and John B. Maus, export manager.

Meetings were held at the plant, but the visitors' headquarters were at the Hotel Kimball, Springfield, Massachusetts, where a banquet concluded the conference.

PENNSYLVANIA RUBBER CO. MEETING.

At the annual meeting of the stockholders of the Pennsylvania Rubber Co., Inc., held at Jeannette, Pennsylvania, Monday, February 19, the following directors and officers were elected for the ensuing year: Herbert DuPuy, chairman; H. Wilfred DuPuy, president-treasurer; Chas. M. DuPuy, vice-president; Seneca G. Lewis, general manager; Geo. W. Shiveley, secretary; Chas. G. Morrill, assistant treasurer.

The five first named and G. A. McLaughlin compose the directorate.

A quarterly dividend of 1¾ per cent on preferred and 1½ per cent on common stock was declared payable March 31 to stockholders of record March 15.

NEW YORK RUBBER CO.

At a stockholders' meeting of the New York Rubber Co., New York City, held on January 30, the following trustees were elected for the ensuing year: John Acken, Rufus A. Brown, William H. L. Lee, E. S. Woodward, Henry Montgomery, H. F. Hering and George Langdon. At a meeting of the trustees on the same date, officers were reëlected as follows: John Acken, president and treasurer; Henry Montgomery, vice-president and secretary; H. F. Hering, second vice-president.

H. MUEHLSTEIN & CO.'S NEW PLANT.

The general offices of H. Muehlstein & Co., scrap rubber merchants, have been removed from Washington and Hubert streets to Third avenue, at One Hundred and Thirty-third street and the Harlem River, where they have a large and finely equipped establishment devoted exclusively to scrap rubber and rubber waste. The plant consists of three connecting buildings, each five stories and basement, with an aggregate floor space of 100,000 square feet, in addition to considerable yard space, and the property affords exceptional rail and water shipping facilities. Included in the special equipment provided for operating the plant are three large elevators, 10 Minnich steel presses and several 7-ton Hurlburt motor trucks.

H. MUEHLSTEIN & CO.'S PLANT, NEW YORK CITY.

BOSTON BANK ESTABLISHES ARGENTINE BRANCH.

The First National Bank of Boston will shortly open a branch at Buenos Aires, under the managership of Noel F. Tribe, a banker of experience who has resided in Argentina for over 20 years. This extension of the bank's activities will be appreciated by merchants and manufacturers interested in trade with this prosperous South American republic.

TRADE NOTES.

The Newport Chemical Works, Inc., New York City, now occupies new offices at 120 Broadway, suite 1605-1606.

At the annual meeting of the Chicago Rubber Clothing Co., Racine, Wisconsin, the capital stock was increased from $175,000 to $350,000, and the following board of directors elected: Walter C. Palmer, George G. Bryant, A. E. Boyeson, James Murphy, E. L. Haynes, Martin Hueffner, Edward L. Baker. The board then organized by electing the following officers: Walter C. Palmer, president; James Murphy, vice-president; George G. Bryant, secretary and general manager; Martin M. Hueffner, treasurer.

Gutta Percha & Rubber, Limited, Toronto, Canada, has donated $5,000 to endow a bed in the Toronto General Hospital for its former president, the late Captain Trumbell Warren, 15th Toronto Highland Battalion, who fell in action on April 20, 1915.

The Farrel Foundry & Machine Co. announces the removal of its Cleveland, Ohio, office on March 1 to 810 Union National Bank Building.

The City Council of Niagara Falls, New York, recently purchased 1,000 feet of fire hose from the Manhattan Rubber Manufacturing Co., of Passaic, New Jersey, and the Bi-Lateral Fire Hose Co., of Chicago, Illinois.

The recently organized India Rubber Co., located at Mogadore, Ohio, has purchased 13 acres of land near the railroad. The company is capitalized for $125,000 and proposes to spend $100,000 in the erection and equipment of the plant. The principal stockholders are J. M. Alderfer, R. M. Pillmore and J. K. Williams. The executive office will be in Akron, Ohio.

The Acorn Insulated Wire Co., Inc., Brooklyn, New York, has increased its capital stock from $25,000 to $60,000, in order to finance the installation of machinery in a new unit of its plant, and also to cover the cost of considerable raw material purchased to guard possible shortage caused by diplomatic complications.

The Standard Underground Cable Co., Perth Amboy, New Jersey, is building a 25 by 75 foot four-story and basement extension to one of the wings of its rubber factory.

The Flawless Rubber Co., of New Castle, Pennsylvania, a year-old corporation, said to be making goods of various descriptions, recently elected George H. Wind, president; John Burns, vice-president; Paul Hartmann, treasurer, and Joseph Ganster, secretary.

The Bunker Hill Rubber Works, Bunker Hill, Illinois, has opened its factory and commenced the manufacture of mechanical rubber goods.

Thomas A. Murray, formerly police commissioner of New Haven, Connecticut, and later connected with the Seamless Rubber Co., of that city, has been elected president and general manager of the National Rubber Co., Pottstown, Ohio.

The Federal Rubber Manufacturing Co., Cudahy, Wisconsin, has recently completed a $200,000 addition to its power plant.

The Kokomo Rubber Co., Kokomo, Indiana, capitalized for $200,000, is reported sold to a holding company for $1,200,000.

The Oldtown Rubber Co., Xenia, Ohio, has been purchased by Robert Kuhn, of Cincinnati, Ohio. A radical change of policy is planned under the new management.

The Mineralized Rubber Co., with headquarters at Newark, New Jersey, is reported to be in the hands of a receiver. The business of the company was the manufacture of a rubber composition cap for automobile radiators. One of the petitioning creditors is Harold C. Dodge, of East Orange, New Jersey, president of the company, whose claim is for $7,000, money advanced.

The stockholders of the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pennsylvania, at a special meeting held recently, unanimously approved an increase in the capital stock from $60,000,000 to $75,000,000. The additional stock will be common and will consist of 300 shares of a par value of $50.

RUBBER FIRMS PLEDGE GOVERNMENT SUPPORT.

RUBBER plays an important part in the national defense, and in connection with the present program of accelerated preparedness it is a sincere pleasure to record the promptness with which leading American rubber manufacturers joined other industrial and commercial establishments in pledging their hearty support to the Federal Government in any emergency that may arise. On February 3, Samuel P. Colt, president, placed the 47 factories, organization, manufacturing resources and distributing facilities of the United States Rubber Co. at the disposal of the government in case of need. The resources of this, the greatest rubber manufacturing firm in the world, are tremendous, its large plantations in Sumatra being an important national asset.

Other great rubber firms to offer their factories include The B. F. Goodrich Co., Akron, Ohio; Firestone Tire & Rubber Co., Akron, Ohio; United & Globe Rubber Manufacturing Cos., Trenton, New Jersey. More names will doubtless have been added to the list before this reaches our readers.

WESTINGHOUSE BUILDS NEW PLANT.

The site for the new plant of the Westinghouse Electric & Manufacturing Co., at Essington, near Philadelphia, Pennsylvania, embraces about 500 acres, with a frontage of approximately one mile on the Delaware River, additional transportation facilities being afforded by tracks from the Pennsylvania and Philadelphia & Reading railroads.

This new center will be devoted to the production of large apparatus, the first group of buildings being for power machinery, principally steam turbines, condensers and reduction gears. The initial development will cost in the neighborhood of $5,000,000 or $6,000,000, occupying about one-fifth of the area of the entire plot, the buildings consisting of two large machine shops, an erecting shop for heavy machinery, forge shop, pattern and pattern storage shop and power house.

The employes to be engaged at the new plant will number several thousand, and undoubtedly will in the future equal the number employed at the East Pittsburgh, Pennsylvania, plant of the company, representing over 20,000 people.

MAKING RUBBERS ON BROADWAY.

The public likes to know how commonly used articles are made, and recent instances indicate that there is no better window advertising than a manufacturing demonstration such as that conducted by the United States Rubber Co., 1790 Broadway, New York City. During the week of January 22 one of the handsomely decorated display windows was fitted up like the making room of a well-equipped rubber footwear factory and four operatives from the Goodyear's Metallic Rubber Shoe Co. manufactured women's croquets and storm slippers, also United States patent pressure process rubber boots in black, red and white. Large crowds showed great interest in the diaphragm machine employed to press the parts of women's rubbers into practically one piece.

NEW METHOD OF SOLING BOOTS.

The American Consul at Leeds, England, reports a patented method of manufacturing boot soles from scrap leather. It is claimed that the soles are non-suction, non-slipping, and water proof; that they can be produced at much lower cost than the ordinary leather sole. Owners of plants for heelbuilding, it is believed, will find themselves in a position to adopt the new process conveniently.

It is also claimed that the novelty of the patent may be enhanced by an ingenious arrangement of strips of rubber attached to a thin layer of canvas, the rubber strips fitting into the interstices of the leather sections. This is said to give a pleasing resiliency to the step of the wearer.

UNITED STATES RUBBER CO. CONSOLIDATES SUBSIDIARIES.

At a special meeting of the stockholders of the United States Rubber Co., held at New Brunswick, New Jersey, on February 14, it was voted unanimously to authorize the carrying out of the plans proposed. The vote was the largest ever held at a stockholders' meeting. Proxies of 83 per cent of every class of stock outstanding were represented.

One proposal was to acquire the real estate, plants and equipment of the companies of which this company owns, or shall own, substantially all of the common capital stock. The effect of this vote is that the following plants will become part of the parent company: Revere Rubber Co., Rubber Regenerating Co., the Naugatuck Chemical Co., the Eureka Fire Hose Manufacturing Co., American Rubber Co., the Joseph Banigan Rubber Co., Boston Rubber Shoe Co., L. Candee & Co., Goodyear's India Rubber Glove Manufacturing Co., The Goodyear's Metallic Rubber Shoe Co., Hastings Wool Boot Co., National India Rubber Co., Shoe Hardware Co. and Woonsocket Rubber Co.

A similar action by the General Rubber Co. stockholders added the following: Morgan and Wright, Hartford Rubber Works Co., G. & J. Tire Co., Mechanical Rubber Co., Mechanical Fabric Co., New York Belting & Packing Co., Stoughton Rubber Co., Peerless Rubber Manufacturing Co., Fabric Fire Hose Manufacturing Co., Midgeley Manufacturing Co., Sawyer Belting Co. and India Rubber Co.

It was also unanimously voted to confirm the directors' plan for a bond issue, all of which is included in the comprehensive ized by the Secretary of State of Connecticut, where this asso-

THE RUBBER ASSOCIATION OF AMERICA, INC., AUTHORIZED.

The change of name of The Rubber Club of America, Inc., to The Rubber Association of America, Inc., has now been authorized by the Secretary of State of Connecticut where this association is incorporated.

Members of the Association have been notified that shipments of rubber goods may now be made direct to the Portuguese islands of the Atlantic, namely the Azores, Cape Verde and Madeira islands. In this connection the British Consul General at New York states that the British War Trade Department feels considerable apprehension lest the ports of Portugal may come to be used for landing goods destined for Spain or elsewhere. Members are urged to send no rubber goods to any Portuguese ports not intended exclusively for consumption in that country.

Secretary Vorhis has sent the members a circular stating that the embargo conditions are not relaxed in any way, with the above exception, and advises that rubber manufacturers again notify their export managers of the terms of their bonds and guarantees so that all engaged in the export trade will be fully informed regarding the situation, and cannot plead ignorance, in the event of violations.

RUBBER COMPANY DIVIDENDS.

The New York Rubber Co. paid a regular dividend of 8 per cent and an extra dividend of 2 per cent on February 1.

The Hood Rubber Co. paid a regular quarterly dividend of 1¾ per cent on preferred stock on February 1 to stockholders of record January 27.

The board of directors of The B. F. Goodrich Co. has declared a dividend of 3½ per cent on preferred stock, payable 1¾ per cent on April 2 to stockholders of record March 23, and 1¾ per cent on July 2 to stockholders of record June 22; also a quarterly dividend of 1 per cent on common stock, payable May 15 to stockholders of record May 4.

EDW. A. BARRIER.

BORN and brought up in Cambridge, Massachusetts, Edw. A. Barrier received his education in the Cambridge schools and was graduated from Massachusetts Institute of Technology in 1905. The rubber industry having appealed to him, he was employed for a time by the Boston Woven Hose & Rubber Co., Cambridge, Massachusetts, in a number of different departments with the idea of learning the business. He soon went into teaching, however, first as assistant instructor in analytical chemistry at the Massachusetts Institute of Technology and later as instructor in analytical and metallurgical chemistry in the University of Cincinnati, Ohio.

E. A. BARRIER.

In 1907 Mr. Barrier became connected with the Inspection Department of the Associated Factory Mutual Fire Insurance Cos. as chemical engineer, and established and organized a chemical laboratory for the examination and testing of rubber and other products. This was one of the first laboratories established in the country which seriously took up the chemical examination of rubber from the consumers' standpoint. As chairman of the Rubber Products Committee, the Sub-Committee on Cold Water Hose and a member of the Pump Valve Committee of the American Society for Testing Materials, Mr. Barrier has played a considerable part in the development of specifications for rubber products, having conducted investigations along these lines, some of the results of which have been published in various periodicals.

RUBBER COMPANY SHARE QUOTATIONS.

The following market quotations of shares of rubber manufacturing companies on February 24 are furnished by John Burnham & Co., 115 Broadway, New York City, and 41 South La Salle Street, Chicago, Illinois:

	Bid.	Asked.
Ajax Rubber Co. (new)	69	72
Firestone Tire & Rubber Co., common	144½	147½
Firestone Tire & Rubber Co., preferred	107	109
The B. F. Goodrich Co., common	55½	56½
The B. F. Goodrich Co., preferred	108	110
Goodyear Tire & Rubber Co., commo	271½	275½
Goodyear Tire & Rubber Co., preferred	106½	108¼
Kelly-Springfield Tire Co., common	53	54
Kelly-Springfield Tire Co., preferred	90	93
Miller Rubber Co., common	253	257
Miller Rubber Co., preferred	105	106¾
Portage Rubber Co.	164	168½
Swinehart Tire & Rubber Co.	79½	85½
United States Rubber Co., common	53½	54½
United States Rubber Co., preferred	105	109

CINCINNATI RUBBER MANUFACTURING CO. MEETING.

At the annual meeting of the stockholders of The Cincinnati Rubber Manufacturing Co., Cincinnati, Ohio., on February 13, the following directors were elected: S. D. Baldwin, F. A. Geier, Jas. A. Green, S. E. Hilles, Geo. McG. Morris, Casper H. Rowe, Stanley M. Rowe, F. D. Scherl; and on reorganization of the board, the following officers were elected for the ensuing year: S. D. Baldwin, president; F. D. Scherl, vice-president and treasurer; S. M. Rowe, secretary. The company has had a prosperous year and the outlook for business the present year is favorable.

PERSONAL MENTION.

Fred H. Ferguson, for over 20 years a salesman of the Boston Belting Co., in Buffalo, New York, and vicinity, has taken the agency for the New Jersey Car Spring & Rubber Co, Jersey City, New Jersey, covering the same territory.

J. A. Kurvy, formerly with Taylor, Armitage & Co., New York City, is now associated with Forney & Co., 350 Broadway, New York City, dealer in sheetings, drills, osnaburgs and special fabrics used by the rubber trade.

Edwin Curbishley, manager of the Xylos Rubber Co., Limited, Manchester, England, manufacturer of reclaimed rubber, recently called on the American rubber trade.

P. J. Ramler, recently connected with the sales department of the Racine Rubber Co., has been appointed manager of sales for the Vulcanized Products Co., Muskegon, Michigan.

E. B. Merriam, for several years assistant engineer of the switchboard department of the General Electric Co., Schenectady, New York, has resigned that position to assume the management of the industrial service department recently organized to supervise education, employment, and provision of opportunities for advancement of employes at the Schenectady plant of the company. He brings to his new position a broad and sympathetic understanding of the requirements of the situation.

F. Richard Carroll is the new district manager for The B. F. Goodrich Co., at San Francisco, California, succeeding C. E. Cook. Mr. Carroll has been manager of the Los Angeles, California, branch for the past six years, and on the eve of his departure from that city, was given a surprise dinner by the Goodrich organization in the South, at which a handsome gold watch and chain were presented to him.

George B. Hodgman, president of the Hodgman Rubber Co., Tuckahoe, New York, and Mrs. Hodgman celebrated the twenty-fifth anniversary of their marriage by entertaining a large number of their friends at a dinner and dance in the ball room of the Ritz Carlton Hotel, New York City, February 23.

FROM THE FAR EAST.

Dr. J. G. C. Vriens, of Medan, Deli, east coast of Sumatra, for the last three years technical adviser of the "Association des Planteurs de Caoutchouc de la Belgique," and for the ten previous years director of the experimental station for tea and tobacco cultivation in Sumatra, was in New York last month, on an enforced supplementary visit. He left Medan some months ago to visit his native city, Rotterdam, visiting Japan, Hawaii and many points of interest in the United States en route, and embarked on the "Ryndam" for Rotterdam, which steamer, when nearly in sight of Europe, was ordered by wireless to put about and return to New York. Doctor Vriens predicts a great future for the rubber plantation industry in Sumatra, with a steady increase in direct shipments from there to this country.

J. C. MATLACK RETIRES FROM AJAX CO.

J. C. Matlack, secretary and general manager of the Ajax Rubber Co., Inc., New York City, tendered his resignation at the annual meeting of the company, February 13. It is his intention to take a long rest at his home at Great Neck, Long Island.

Starting in business with the Simmons Hardware Co., in St. Louis, Missouri, he rose to the management of the bicycle and accessory department of that house and then went to A. Fetherstone Co., of Chicago, Illinois, as eastern sales manager. When the American Bicycle Co. was organized he became purchasing agent for the more than 60 factories. In 1901 he was made western sales manager, which position he resigned in 1902 to become president of the International Automobile & Vehicle Tire Co., Milltown, New Jersey. In 1907, when this company was succeeded by the Michelin Tire Co., he was made vice-president and general manager. In 1911 he left the Michelin company to connect himself with the newly organized Ajax Rubber Co., as secretary and general manager, and the success of that company under his able management is too well known to need further mention.

Mr. Matlack is too active and vigorous to retire and it is quite unlikely that he will content himself to remain out of business for any great length of time. He is succeeded in the Ajax company by Fred E. Dayton, who acts as general sales manager.

RICHARD A. LEIGH.

RICHARD A. LEIGH, general manager of the Dry Climate Tire Manufacturing Co., Arvada, Colorado, began his business career as an apprentice with the Revere Rubber Co., Chelsea, Massachusetts, in 1888, under the direction of his father, who was then factory superintendent. Later he became associated with the Boston Car Spring Co., Boston, Massachusetts, and from there went to the Reading Rubber Tire Co., which later merged into the Consolidated Rubber Works, taking over the plant of the Chelsea Fabric Co., Chelsea, Massachusetts. The firm was afterwards absorbed by the United States Rubber Co. and the plant and machinery transferred to the National Rubber Co., Bristol, Rhode Island, with which Mr. Leigh was connected for five years. He then became tire expert for the Mechanical Rubber Co., Cleveland, Ohio, from which position he went to take up his present work. The Dry Climate Tire Manufacturing Co. is to be congratulated upon having as general manager a man of such long and varied practical experience in the manufacture and selling of rubber goods.

R. A. LEIGH.

BATAVIA RUBBER CO. ABSORBS SIMPLEX RUBBER CO.

At a special meeting of the stockholders of the Batavia Rubber Co., held at the main offices of the company at Batavia, New York, February 23, the capital stock of the company was increased from $500,000 to $675,000 to provide for the purchase of the plant and other assets of the Simplex Rubber Co. of America, Ossining, New York. The Batavia company manufactures pneumatic automobile tires and the Simplex company solid rubber truck tires.

The merger of the two companies has also been authorized by the Simplex stockholders and the plant and organization will probably be moved to Batavia as soon as arrangements can be completed, and will occupy a site recently purchased by the Batavia company, adjoining its present factory. The consolidated company will be known as the Batavia Rubber Co. and will manufacture pneumatic automobile tires, solid rubber truck tires and a line of mechanical goods.

NEW INCORPORATIONS.

Amazon Rubber Co., The, February 6 (Ohio), $500,000. L. J. Schott, Louis F. Smith, C. Bettler, J. Henry Adams, and Frank B. Burch. Principal office, Akron, Ohio. For the purpose of taking over the entire assets of The Amazon Tire & Rubber Company and operating the present plant on a much larger scale.

American Garter Co., February 9 (Delaware), $125,000. Sidney C. Wallace, L. L. Cowan and R. Montgomery—all of Chicago, Illinois. To manufacture and deal in garters, hose supporters, etc.

Bulley Rubber Machinery Co., February 9 (Delaware), $100,000, Herbert E. Latter, and Norman P. Coffin, Wilmington, Delaware, and Clement M. Egner, Elkton, Maryland. To manufacture all kinds of machinery and appliances adaptable to the milling, mixing and compounding of rubber and rubber cements.

Central Vulcanizing Works Inc., February 17 (New York), $10,000. Jacob Brown and Tillie Brown, Albany, New York, and B. F. Barford, Valatie, New York. Tire repair and sales business.

Clouse Tire & Repair Co., The, December 11 (Ohio), $25,000. J. E. Phillips, 6513 Euclid avenue; A. W. Gillespie, 1779 East Sixty-fifth street; M. Clouse, 2114 East Eighty-third street—all in Cleveland, Ohio. Principal office, 6513-6515 Euclid avenue, Cleveland, Ohio. To take over the Clouse Tire Repair School Co.

Double Fabric Tire Co., January 10 (Indiana), $900,000. W. H. Willennar, A. L. Murray, Simon J. Straus and Isaac D. Straus. Principal office, Auburn, Indiana. To manufacture and sell tires, tubes, and tire accessories.

Endurance Tire & Rubber Corporation of New York, January 27 (New York), $1,000,000. Harry G. Smith, Benjamin F. Norris, and Frank B. York—all of 271 Broadway, New York City.

Finebergs' Auto Tire & Accessory Co., January 29 (New Jersey), $100,000. Isaac Fineberg, Herman Fineberg, Samuel Fineberg—all of Trenton, New Jersey. Principal office, 10-12 East Hanover street, Trenton, New Jersey. To deal in tires, etc.

Grayson, S. J., Inc., February 16 (New York), $2,000. S. J. Grayson, Hohokus, New Jersey; Charles Netter and Robert Netter, 220 Broadway, New York City. Tires and rubber goods.

Hoosier Tire Co., September 26, 1916 (Indiana), $10,000. Eugene M. Fife, W. R. Fife, and E. H. Fife—all of Indianapolis, Indiana. Principal office, Indianapolis, Indiana. To deal in tires.

Jones Rubber Heel Co., Inc., February 5 (New York), $25,000. A. H. Serrell, Woolworth Building; James J. Jones, 13 Park Row, and Edward O. Towne, 214 West Ninety-second street—all in New York City.

Kirkham, I. C., Sales Co., Inc., January 24 (New York), $12,000. Isaac C. Kirkham, 1365 Bedford avenue; E. A. Carleton, 959 Bedford avenue, and M. L. Kirkham, 1246 Pacific avenue—all in Brooklyn, New York. To deal in auto tires, etc.

Kokomo Rubber Tire Co., Inc., January 27 (New York), $5,000. William Adelson and Edward J. Carter, 15 Broad street, and Thomas H. Keogh, 52 Broadway—both in New York City. To manufacture tires, etc.

Lambert Tire Co., January 3 (Washington), $5,000. H. S. Chapman, M. F. Landrith, L. W. Lemon.

Laravie, O. J., & Co., Inc., January 29 (New York), $2,000. Oscar J. Laravie and Emogene S. Simons, Albany, and Clarence T. Dolson, Watervliet—both in New York. To deal in auto tires, accessories, etc. Principal office, Albany, New York.

Liberty Tire & Rubber Co., Inc., January 29 (New York), $10,000. Joseph Prince, 119 East One-hundred and First street; Robert C. Schlesinger, 638 West One-hundred and Sixtieth street, and Leon Kronfeld, 400 Riverside Drive—all in New York City.

Marathon Tire Sales Co., January 10 (Indiana), $25,000. R. P. Oblinger (president), H. E. Rasmussen (treasurer), M. M. Fancher (vice-president), and J. D. Meek (secretary)—all of Indianapolis, Indiana. Principal office, Indianapolis, Indiana. To manufacture and sell tires and rubber goods.

Morrow Insulating Co., Inc., February 1 (New York), $25,000. John J. Morrow and Clara Morrow, 674 Acadamy street, New York City, and H. M. Lewis, 2055 Washington avenue, Bronx, New York. To manufacture insulating material, etc.

National Tire Protector Co., February 8 (Delaware), $50,000. J. Daniel Melchior, Max F. Henkelman and F. J. Helnegel, all of Scranton, Pennsylvania. To manufacture and deal in all articles for the protection of automobile and motor vehicle tires.

Nuremburg Manufacturing Co., Inc., January 26 (New York), $600. Robert B. Gunshor, Paul Hoffman and David Dricker—all of 55 Liberty street, New York City. To manufacture artificial trees, toys, etc., of rubber, paper composition and other materials.

Oakland Tire Co., Inc., February 13 (New York), $50,000. Sydney Bernheim, 35 Nassau street, New York City; Catherine A. Weldon, 591 Seventh street, and Harry H. Jacobson, 555 Grand street—both of Brooklyn, N. Y. To manufacture all kinds of tires, etc.

Resilia Co., The, January 17 (Massachusetts), $200,000. Frank D. Wilde, 225 Hunnewell terrace, Newton; Oliver E. Chapman, Sharon, and Marion E. Zink, 526 Washington avenue, Revere—all in Massachusetts. Principal office, Boston, Massachusetts. To manufacture and deal in certain patented articles to be used in connection with other articles or goods to furnish resiliency and elasticity.

Rochester Tire Works, Inc., January 24 (New York), $5,000. G. C. Kingdon, Grace Horth and F. A. Scholls—all of Rochester, New York. Principal office, Rochester, New York. To deal in auto tires, etc.

Steiner, O. A., Tire Co., January 3 (Oklahoma), $10,000. J. C. Treat (president), S. W. Steiner (vice-president), O. A. Steiner (secretary-treasurer), and E. L. Russell—All of Tulsa, Oklahoma. Principal office, Tulsa, Oklahoma. Automobile tires and accessories.

Sterling Tire Corporation, February 1 (Delaware), $2,500,000. Joseph A. Miller, 227 Fairview avenue, Rutherford; Otto Basten, East Rutherford, and Bartlett Greene, Passaic—all in New Jersey. Principal office, 486 du Pont Building, Wilmington, Delaware. To manufacture and deal in rubber tires for vehicles of all kinds.

Vulcum Tire Filler Co., August 17, 1916 (Indiana), $10,000. Franklin A. Colver, Joseph J. Greenen and Oliver J. Boulden. Principal office, Indianapolis, Indiana. To manufacture tire fillers and mechanical devices for the filling of tires.

Woodworth Manufacturing Corporation, January 3 (New York), $125,000. Charles B. Woodworth and Desmond Woodworth, Niagara Falls; Elmer H. Paterson, Howard G. E. Smith, Buffalo, and Robert H. Mahaney, Lockport—all in New York. Principal office, Whirlpool street, Niagara Falls, New York. To manufacture and deal in automobile accessories of all kinds and description.

PROMOTING RUSSIAN TRADE.

Exporters of rubber goods desirous to increase their business with Russia, the largest and most favorable of our distant foreign markets, and one that is daily growing with a rising civilization and quickening development, can obtain valuable information in pamphlet form, also specific advice and assistance, upon application to the American-Russian Chamber of Commerce, New York City, the mission of which is to promote American-Russian trade relationships.

AJAX AND RACINE RUBBER COMPANIES.

At the annual meeting of the Ajax Rubber Co., Inc., New York City, held February 13, the following officers were elected:

Horace De Lisser, chairman of board, New York City; William G. Grieb, president, Scarsdale, New York; L. P. Destribats, vice-president, Trenton, New Jersey (in charge of Trenton plant). H. L. McClaren, vice-president, Racine, Wisconsin; Louis T. Vance, vice-president, Racine, Wisconsin (in charge of Racine plant). Harold W. Stimpson, treasurer, New York City; William J. Jackson, secretary, Brooklyn, New York.

These, together with the following, comprise the directorate: Herbert H. Maass, New York City; Robert A. Patteson, Tarrytown, New York; L. B. Patterson, Chicago, Illinois; Joseph Weissenbach, Chicago, Illinois; Hugh K. Prichitt, New York City; Fred E. Dayton, New York City; H. C. Severance, Racine, Wisconsin; Stuart Webster, Racine, Wisconsin.

The combined statement of the Ajax Rubber Co. and the Racine Rubber Co. for the period ending December 31, 1916, shows sales to the amount of $10,335,177.70. The balance sheet may be summarized as follows:

Gross credits		$12,684,463.26
Total debits		9,856,447.25
Gross profit from trading		$ 2,828,016.01
Total expense		1,559,704.80
Net profit from trading		$ 1,268,311.21
Assets		$ 8,629,061.21
Liabilities, including capital stock, accounts payable, reserves and stock of Racine Rubber Co. in process of redemption	$ 8,473,885.42	
Surplus and undivided profits	155,175.79	
		$8,629,061.21

The Ajax company took over the Racine company last December, hence this combined statement.

At the annual meeting of stockholders of the Racine Rubber Co. held at Racine, Wisconsin, January 30, 1917, the following directors were elected for the ensuing year: W. G. Grieb, H. L. McClaren, L. T. Vance, Stuart Webster, H. C. Severance, Horace DeLisser, Louis P. Destribats. The directors then elected the following officers: H. L. McClaren, president and general manager; L. T. Vance, vice-president and general factory manager; Stuart Webster, treasurer; H. C. Severance, secretary and general sales manager.

MOTOR AND ACCESSORY MANUFACTURERS COMMITTEES.

At a meeting of the Motor and Accessory Manufacturers, held early in February, it was decided to admit to membership makers of airplane motors, parts and accessories. A decision was reached to considerably expand the credit department. Among the subjects discussed were the Administration's $248,000,000 Revenue Bill and the pending Morrison Bill regarding registration of designs.

President C. W. Stiger of the Motor and Accessory Manufacturers' Association, has just announced the various committees to serve for the ensuing year. As has been the custom of The M. & A. M. for years past, President Stiger will also act as chairman of the Executive Committee. With him are: C. E. Thompson, E. H. Broadwell, James H. Foster, W. O. Rutherford, Christian Girl and Alfred P. Sloan, Jr.

First Vice-President C. E. Thompson has been appointed chairman of the Finance Committee, which is composed of the same men who constitute the Executive Committee.

The Show and Allotment Committee: Christian Girl, chairman; C. E. Thompson, E. H. Broadwell, J. H. Foster and William C. Rands.

William M. Sweet, former manager of The M. & A. M., who has for several years so successfully conducted the annual banquet of The Motor and Accessory Manufacturers, has been appointed chairman of the Banquet Committee. The other members are: E. H. Broadwell, T. J. Wetzel, James H. Foster and Christian Girl.

Membership Committee: E. W. Beach, E. H. Broadwell and T. J. Wetzel. Auditing Committee: C. W. Stiger, president; Alfred P. Sloan, Jr., secretary, and L. M. Wainwright, treasurer. Aeronautic Committee: President Stiger, Vice-President Thompson and William M. Sweet.

THE KELLY-SPRINGFIELD TIRE CO. REPORT.

The net sales of the Kelly-Springfield Tire Co., New York City, for the year 1916 were $10,883,182.76. This company did no war business during the year. It was this greatly increased demand for its products that caused the directors to determine to build the new and much larger factory at Cumberland, Maryland, previously announced in these pages.

STATEMENT OF INCOME AND PROFIT AND LOSS.

Gross profit	$3,464,458.77
Less: Operating expenses, including selling, administrative and general expenses	1,404,388.26
Net operating income	$2,060,070.51
Other income, net: Cash discounts, interest and miscellaneous.	57,243.33
Net income for the year	$2,117,313.84

BALANCE SHEET.

ASSETS.

Cash in banks and on hand		$ 983,511.76
Notes receivable		52,732.19
Accounts receivable	$1,959,816.57	
Less reserve for doubtful debts and discounts.	109,231.51	
		1,850,585.06
Inventories, at cost		2,218,141.70
Charges deferred to operations		22,373.81
Current assets		$ 5,127,344.52
Sinking fund for debenture bonds: Cash and debenture bonds purchased		147,851.00
Plant accounts, good will and patent rights, less reserve for depreciation		7,887,356.95
		$13,162,552.47

LIABILITIES.

Accounts payable		$ 187,910.80
Reserved for pay roll, taxes, etc.		98,327.98
Dividends and interest payable:		
Dividends:		
1½ per cent on first preferred stock issued, due January 3, 1917	$53,899.50	
Interest of 4 per cent on income debenture bonds outstanding, due April 1, 1917	10,800.00	
		64,699.50
Current liabilities		$ 350,938.28
50-year sinking fund 4 per cent income debenture bonds (Cash and debenture bonds purchased, per contra, $147,851.00)		270,000.00
Capital stock:		
6 per cent first preferred	$3,593,300.00	
Common	4,907,200.00	
		8,500,500.00
Sinking fund for redemption of stock and bonds:		
6 per cent preferred stock	$ 75,164.00	
4 per cent income debenture bonds	158,651.00	
		233,815.00
Reserve for bonus distribution		111,731.38
Cumberland plant account, less factory site expense		238,827.81
Surplus and working capital, per annexed statement		3,456,740.00
		$13,162,552.47

NEW LOS ANGELES BRANCH FOR FIRESTONE.

The Firestone Tire & Rubber Co., Akron, Ohio, recently established a tire distributing building at Los Angeles, California, said to be the finest and largest branch service building in that section. It is a three-story, reinforced concrete and stucco structure, decorated with ornamental tile and of Oriental style of architecture. An elaborate celebration marked the opening of the new branch, in which 500 Firestone dealers from Southern California, Arizona and Nevada, and municipal officials and prominent citizens took part. The Firestone officials who spoke were R. J. Firestone, vice-president; S. G. Carkhuff, secretary; E. W. BeSaw, western district manager, and A. T. Smith, branch manager.

FISK RUBBER COMPANY INSTALLS WRAPPING MACHINES.

In October, 1915, the Fisk Rubber Co., Chicopee Falls, Massachusetts, installed a machine for wrapping tires with burlap or paper, prior to shipment. This was the first machine of its kind ever built.

After having operated this machine successfully for more than a year, requirements demanded a second machine, which was duly installed.

This type of machine, which has a capacity of fifty bundles an hour, is not only being used in this country, but in Europe as well, where its efficiency is recognized on account of the scarcity of labor.

TRADE NOTES.

The Federal Rubber Co., Cudahy, Wisconsin, recently purchased a 4,000-horse-power turbine from the Allis-Chalmers Manufacturing Co., which will furnish power for the new mills and calenders to be located in the addition to the company's plant now in process of erection.

The Tubeless Tire & Rubber Co., Millersburg, Ohio, maker of tubeless and pneumatic automobile tires, has increased its capital stock from $75,000 to $1,000,000 for the purpose of selling its own products.

The Firestone Tire & Rubber Co., Akron, Ohio, announces through its Michigan manager, H. A. Coffin, that a building costing in the neighborhood of $500,000 is to be erected on the company's leased site at the northeast corner of Woodward and Canfield avenues in Detroit, just opposite the present location. A portion of the new building will be sub-leased, but under conditions that will make it possible for the Firestone company to expand its facilities whenever necessary.

The Mohawk Rubber Co. of New York, Inc., has opened a branch at 86 Brookline avenue, Boston, Massachusetts, where a complete stock of tires made in its Akron, Ohio, factory will be kept on hand. Norman W. Biggart, of New York City, will be manager.

The Ten Broeck Tyre Co., Louisville, Kentucky, will manufacture the cotton fabrics needed in its production of rubber tires for automobiles and other vehicles and is now arranging to install an equipment for spinning and weaving. The new machinery will be used for making the fabric for the Atlasta puncture and blow-out proof tube, for which the company has contracted with the Servis Tire & Tube Co. to manufacture for a period of five years.

The Bowling Green Rubber Co. has removed its plant from Bowling Green, Ohio, to Toledo, Ohio, gaining thereby better shipping facilities and larger manufacturing space.

The Midland Tire & Rubber Co., Coshocton, Ohio, has increased its capital stock from $10,000 to $500,000.

At a recent stockholders' meeting of the Norwalk Tire & Rubber Co., Norwalk, Connecticut, $500,000 additional preferred capital stock was authorized, $250,000 worth to be issued at once, this action rendered necessary to care for the increased volume of business and additional manufacturing space and equipment.

The California Tire & Rubber Co., tire distributer, San Francisco, California, is capitalized for $25,000, and operates an effective vulcanizing department in connection with its business. The principal officers of the company are Captain William H. Homer, president, and George C. Homer, vice-president and secretary. Wesley D. Smith is sales manager.

The Toliver Punctureproof Tube Co., Denver, Colorado, has moved into new quarters which have a capacity of 500 tubes per day. Joseph Stein is vice-president and general manager.

The H. H. H. Tire & Manufacturing Co., jobber of automobile supplies and accessories, Newark, New Jersey, takes possession on March 1 of an entire building at 21 Baldwin street, which will serve as a general office and warehouse, the present store at 263 Halsey street being retained as a salesroom. This company has recently issued $25,000 worth of preferred stock in order to obtain additional working capital to care for its greatly increased business.

At the recently held first annual meeting of the Hawkeye Tire Co., Des Moines, Iowa, it was voted to change the name to the Hawkeye Tire & Rubber Co. John Christie, president; John Fredericks, vice-president, and C. B. Hextell, secretary-treasurer, were all reëlected.

The newly organized Red Cross Rubber Co., Norwalk, Ohio, expects to commence operations in the early Spring. C. V. Martin is manager of the company.

The National Tire & Rubber Co., East Palestine, Ohio, has recently been acquired by a syndicate of local capitalists. New plans deal with a material increase in the scope and province of the concern.

The plant of the Toledo-Findlay Tire & Rubber Co., Findlay, Ohio, was offered for sale February 13 but was not sold owing to the extreme cold weather and delayed railroad traffic. The next date of sale has not yet been decided upon.

The Amazon Tire & Rubber Co., Akron, has appointed Tritt & Gockley, Canton, Ohio, distributers for Stark and Tuscarawas counties, with exclusive selling rights.

The Ehman Tire & Rubber Co., succeeding the Vail Rubber Co., Chicago, Illinois, has become, under the direction of A. C. Ehman, its president, one of the important rubber manufacturing concerns of the West. The present output is 300 tires daily and an extensive line of mechanical goods and molded specialties. The additions now under construction will materially increase the capacity of the plant and there is every indication of a greatly augmented volume for 1917.

The Pennsylvania Rubber Co., Jeannette, Pennsylvania, has the contract to supply its Vacuum Cup tires for the 30 new motor vehicles of the Frank Parmelee Transfer Co., the principal transportation company of Chicago, Illinois.

The Centaur Tire & Rubber Co., Gallipolis, Ohio, is reported bankrupt. Pittsburgh capital was principally interested.

FIRESTONE APPOINTMENTS.

D. F. White, since 1910 head of the salesmen's department of the Firestone Tire & Rubber Co., Akron, Ohio, has been appointed Southern district manager.

W. S. Dellett has been given the managership of the Houston, Texas, branch.

R. L. Benham is now manager of the company's branch at San Antonio, Texas.

H. A. Lane, former salesman for the Firestone Tire & Rubber Co., is now manager of the Brooklyn, New York, branch.

NEW APPOINTMENTS OF THE GOODYEAR TIRE & RUBBER CO.

C. W. Martin, Jr., for five years manager of the motor truck tire department, has been placed in charge of the Southern district, with headquarters at Atlanta, Georgia.

R. S. Wilson, formerly in charge of the service department, is now manager of the motor truck tire department, G. E. Brunner, his assistant, being advanced to the position of manager of the service department.

W. R. Bliss, formerly manager of the Boston, Massachusetts, branch, has been made manager of the New York district, the assistant managership being given to D. M. Colwell, formerly manager of the Southern district.

B. S. Waterman, assistant manager of the New England district, assumes management of the Boston branch, continuing to care for the company's manufacturers' business in the New England district.

TIRE PRICE ADVANCES JUSTIFIED.

OFFICIAL figures seem to show that rubber manufacturers were fully justified in raising prices for their products, as many of them did the first of the year. A comparative table of the figures of three leading companies that have recently completed their fiscal years has been compiled by a leading financial journal which shows the gross, net, and ratio of manufacturing expense to gross, as follows:

	Goodyear.	U. S. Rubber.	Goodrich.
1916 gross	$63,950,000	$125,000,000	*$73,000,000
1915 gross	36,490,000	92,861,000	55,416,000
1916 net	7,003,000	12,500,000	9,550,000
1915 net	5,137,000	11,539,000	12,265,000
1916 manufacturing ratio	89.0 per cent	90.0 per cent	86.9 per cent
1915 manufacturing ratio	85.9 per cent	87.5 per cent	77.8 per cent

*Estimated.

It will thus be seen that The B. F. Goodrich Co. to gain $17,000,000 gross income over 1915 figures, had to spend $20,000,000 more than in 1915. The United States Rubber Co.'s increase in gross income was $32,000,000, but its profits were only about $1,000,000 more than the previous year. The Goodyear Tire & Rubber Co.'s gross increase was 13 times as large as its net increase. Such figures are the best evidence that last year's selling prices were too low for safe business.

TIRE FABRICS BOOMING NEW BEDFORD.

The unprecedented demand for tire fabrics has resulted in a great boom for New Bedford, Massachusetts, and the cotton yarn trade generally. It is estimated that fully one-third of the yarn spindles in that city are now running on tire fabric yarns and the consumption of long-staple cotton is tremendous.

New Bedford to-day is to the American cotton industry what Liverpool is to the British industry. It has become the largest spot cotton center in the East. Southern shippers are sending thousands of unsold bales there in order to make prompt deliveries when called upon, unaffected by transportation difficulties. Storage facilities during the past year have been increased to the extent of 100,000 bales, or nearly a quarter of the total consumption of New Bedford mills, and are still inadequate. The New Bedford Storage Co. is authority for the statement that during this cotton season 1,500,000 bales will be used within a 35-mile radius of New Bedford. That city itself will take 450,000 bales. Fall River the same, and the mills around Providence, Taunton and elsewhere in the vicinity will take 600,000 bales more.

Two new tire fabric yarn mills are being erected; the Sharp with 100,000 spindles and the Manomet with 75,000, while the new Rotch mill with 350 to 400 looms, the first weaving mill in New Bedford to make tire fabrics, seems likely to be the forerunner of a new and highly profitable industry there which is only slightly seasonal in character. Motorists do not put up their cars in winter as much as formerly and the demand for tire yarns is remarkably steady. It has been estimated that about 2,500,000 pounds are being purchased weekly. About 75 per cent of all New Bedford tire yarn is made of Sakellarides Egyptian cotton, the balance being Sea Island. Most yarns are 22¾ to 23 count with some 20 count, usually combed though sometimes carded. For the most part they are sold single on section beams and the weaving mills ply them, usually elevenfold.

CHAS. E. MILLER'S NEW BUILDING AT ANDERSON, INDIANA.

PROGRESS OF THE VICTOR RUBBER CO.

At the recent annual stockholders' meeting of The Victor Rubber Co., Springfield, Ohio, the following officers and directors were elected: H. H. Durr, president; F. R. Talbott, general manager and treasurer; Arthur Sackett, secretary; C. A. Swinehart, assistant general manager; H. J. Robben, vice-president; Ben Johnson, and John L. Bushnell.

General Manager Talbott reported satisfactory conditions for the year 1916 and even better prospects for this year. The plant has been in continuous operation night and day for over two years and although the company carries on a large business in rubber automobile mats, the principal increase has been in its pneumatic tires and tubes. A modern, second-story addition covering the present plant and more than doubling the floor space, will shortly be erected.

KING TUBELESS RUBBER CO. LOCATES AT YOUNGWOOD, PENNSYLVANIA.

The King Tubeless Rubber Co. has contracted for the purchase of the Fair Park at Youngwood, Pennsylvania, containing 30 acres and about 20 buildings of various sizes, about half of which can be readily adapted for tire manufacture, and the entire property will be reserved for expected future development. W. E. Russell is president of this company, which controls the use of all King Tubeless tire patents for the states of Pennsylvania and Maryland, under license from The Punctureless Auto Tire Co., Akron, Ohio, owner of the patents. The present branch office is at 3302 Grant Boulevard, Pittsburgh, Pennsylvania, and a Philadelphia, Pennsylvania, branch will be opened in the near future.

GORDON TIRE & RUBBER CO.

A stockholders' meeting of the Gordon Tire & Rubber Co., Canton, Ohio, has been called for February 28 for the purpose of voting to increase the capital stock from $600,000 to $1,000,000 to provide for enlargements of the plant now under way and to erect additions on the plot of land more than three acres in extent purchased recently from the city of Canton. Some of the additions will be completed and in operation by April 1, by which time the force will be increased from 200 to 300 hands. These enlargements are in the tire, tube and druggists' sundries departments. C. W. McKone has been promoted general superintendent. W. E. Ballsborough, formerly with the Star Rubber Co., Akron, Ohio, will have charge of the druggists' sundries department, succeeding M. B. Clark, who recently resigned. H. R. Platt, formerly with the Batavia Rubber Co., has been made superintendent of the tire and tube department.

At the last meeting of the directors C. W. Keplinger was re-elected president; H. B. McMaster, vice-president and general manager; C. J. Keplinger, secretary and treasurer, and they, with Isaac Harter, Judge Henry Harter, J. C. Keplinger, G. W. Ake and Samuel Ake, form the board of directors.

S. Hodge Smith, formerly at the Republic Rubber Co., Youngstown, Ohio, has been made superintendent of the Gillette Safety Tire Co., Eau Claire, Wisconsin.

A. A. Peterson will act as superintendent of the Globe Tire Co.'s plant at Laporte, Indiana.

FIRST PAN-AMERICAN AERONAUTICAL EXPOSITION.

OF peculiarly timely interest, considering the present international situation, was the Pan-American Aeronautic Exposition at the Grand Central Palace, New York City, February 8 to 15, under the auspices of the Aero Club of America, the Pan-American Aeronautic Federation, and the American Society of Aeronautic Engineers.

Owing to the enterprise of the managers and of these associations, 25,000 or 30,000 tickets were sold in advance, and throughout the entire session the building was crowded with interested spectators. There were huge dirigibles, kite balloons, biplanes, monoplanes and other varieties of aircraft, accessories and war equipment. Special exhibits of remarkable interest were contributed by the United States Army and the United States Navy Aviation sections, Signal Corps, Weather Bureau and Bureau of Standards. There were more than 100 exhibitors.

Each day was devoted to some particular phase of the science of aeronautics and many men prominently interested in this line gave instructive addresses. Among those connected with the rubber industry who thus contributed were E. R. Preston, of the Goodyear Tire & Rubber Co., Akron, Ohio, whose address was "Coöperation with the Preparedness Movement"; Raymond B. Price, of the United States Rubber Co., New York City, spoke on "The Rubber Industry for Preparedness," and C. F. Smythe, of the Connecticut Air-Craft Co., New Haven, Connecticut, delivered an address on "Developing the Dirigible for Commercial Purposes."

Not many of the exhibits were directly connected with the rubber industry, but what they lacked in number they gained in prominence. Of course there were a number of rubber tires and shock absorbers for airplanes, but particularly interesting were the following exhibits:

The Connecticut Air-Craft Co. showed dirigibles and their housings. One of the company's dirigibles was suspended from the ceiling at the entrance of the Palace, and some types of the non-rigid Vedette for scouting and sporting purposes were also shown. The bags for these were made of a special fabric developed at the American factory of the United States Rubber Co., Cambridge, Massachusetts. The United States Rubber Co. also exhibited a line of balloon fabrics, a line of clothing and shoes for aviators, and a collection of mechanical sundries for airplanes, flying boats, etc., shock absorbers and rubber matting.

The Goodyear Tire & Rubber Co. exhibited a huge kite balloon such as was shown in the July, 1916, issue of THE INDIA RUBBER WORLD. This was suspended from the ceiling in the center of the exhibition hall and created great interest on behalf of the visitors.

One effect of the exhibit is the plan to purchase this kite balloon and present it to the government. The idea originated with Mrs. Charles A. Van Rensselaer, one of New York's most influential and public-spirited women. So strong was her desire to see the extension of the aeronautic defense arm of the government that she started a fund for the purchase of this balloon and the establishment of a training school for kite balloon operators, the plan being to locate this school at Governor's Island in New York Harbor.

THE ROYAL DUTCH CO. IN AMERICA.

The sale to Kuhn, Loeb & Co., New York City, of a block of shares of the Royal Dutch Co., principal competitor of the Standard Oil Co. in the world's markets, and owner of two petroleum producing companies in Oklahoma and California, seems to presage increased activity of this firm in the United States. It is known that the output of their wells is being greatly increased. In the absence of any authorized statement as to the intentions of the company, interested observers express the belief that in any event the new move will have a marked influence on the American gasolene and solvent naphtha situation.

AERONAUTIC MANUFACTURERS' ASSOCIATION.

ON February 9, during the First Pan-American Aeronautic Exposition in New York City, fifteen airplane manufacturers with a combined capital of $30,000,000 and a total capacity of 175 machines a week, organized the Aeronautic Manufacturers' Association, pledged their full support and placed all their resources at the command of the government.

The organization will provide for the interchange of ideas concerning aeronautics of every kind and will arrange for the standardization of airplane manufacture.

The firms represented are: International Aircraft Co., Chicago, Illinois; The Burgess Co., Marblehead, Massachusetts; Curtiss Aeroplane & Motor Corporation, Buffalo, New York; Thomas-Morse Aircraft Corporation, Ithaca, New York; L. W. Flint Engineering Co., College Point, New York; United Eastern Aeroplane Co., Brooklyn, New York; Gallaudet Aircraft Corp., New York City; Brook Aircraft Co., Saginaw, Michigan; General Aeroplane Co., Detroit, Michigan; John D. Cooper Aeroplane Co., Bridgeport, Connecticut; Heinrich Aeroplane Co., Inc., New York City; Standard Aero Corp., Plainfield, New Jersey; S. S. Pierce Aeroplane Corp., Southampton, New York; The Benoist Corp., Sandusky, Ohio., and the American Motorplane Co.

AN AMERICAN AIRCRAFT FLEET.

The prospects are that henceforth rubberized fabrics for military purposes will be in greater demand than ever before. In accordance with its present policy of preparedness the United States Government contemplates the building of a formidable aircraft fleet and the work is already well under way. Early last month the government placed with The Burgess Co., Marblehead, Massachusetts, the largest order for airplanes and seaplanes ever given to one firm in this country. The number is not known, but as 200 men are already in the employ of the company and a new factory is in course of erection it is probably large, with the prospect of further orders. It is said that the new plant will be surpassed by only one other in the world.

An important conference was held in Washington the middle of the month, when the representatives of the United States Rubber Co., The B. F. Goodrich Co., the Goodyear Tire & Rubber Co., the Connecticut Aircraft Co. and the Curtiss Aeroplane & Motor Corp. met Rear Admiral David W. Taylor, chief constructor of the navy and head of the joint army-navy board of investigation of aerial problems. The conference resulted in an agreement whereby these firms will work together to furnish dirigibles for the use of the government.

The aeronautical department of the Goodyear Tire & Rubber Co., Akron, Ohio, is already at work on government contracts to construct war, kite and observation balloons, as well as to supply rubberized material for parachutes, ponchos, coats and blankets.

PROJECTED CASCADE TUNNEL WOULD BENEFIT THE RUBBER INDUSTRY.

Seattle, Washington, has latterly become an important port of entry for plantation rubber from the Far East. Manufacturers of rubber goods in the Middle West will therefore be glad to lend their hearty support to the project of General Henry M. Chittenden, chairman of the Seattle Port Commission, to build a 30-mile railway tunnel, the longest in the world, under the main range of the Cascade Mountains from Skykomish to Leavenworth, Washington. This would shorten the route 48 miles, lower the summit elevation 2,166 feet and reduce the running time of freight trains 8½ hours at a saving in maintenance to the Great Northern Railway which, together with the resulting traffic increase, would not render the estimated cost of $50,000,000 unreasonable. It is to be hoped that the next decade may witness the realization of this gigantic scheme.

THE RUBBER TRADE IN BOSTON.

By Our Regular Correspondent.

THE rubber footwear manufacturers in this state are unusually busy. There is a general complaint that it is impossible, or at least very difficult, to secure sufficient experienced help to keep the output up to the full capacity of the factories. At the same time the amount of orders already taken is far in excess of that at any previous year at corresponding date. These orders are for rubber overshoes, and for tennis lines. The latter style of footwear is to have a great boom, so it is predicted, as soon as warm weather comes, because of the high and still rising prices of leather shoes. The cheap "sneaker" is now simply a poor relation of the handsome styles of cloth top rubber-soled footwear, which, while originally designed only for sports and outing wear, will be worn for business and social wear also this coming summer.

* * *

The Plymouth Rubber Co., of Stoughton, shows a splendid record for the past year, its net sales being 28 per cent in excess of those for the year ending December 31, 1915; in fact, last year's sales were the largest in the company's history, while the orders on hand for the present year are reported to be so large as to necessitate the erection of a new building as well as additions to some of the old buildings. Mention has been made of the plan to erect a reinforced concrete building 171 by 98 feet, 2 stories, but so built that another story may be added when occasion requires, this new building to be used entirely for the manufacture of rubber soles and heels, and to have a capacity of about 200,000 pairs per day.

THE PLYMOUTH RUBBER CO.'S PLANT.

The success of the company has been rapid. The present plant consists of 15 buildings ideally situated as regards transportation facilitates on the spur track near the junction of two branches of the New York, New Haven & Hartford railroad, the majority of the buildings being less than 10 years old and some of the older having been largely added to and modernized. The plant has an effective water power.

The company manufactures "Slipknot" Safety heels and Durable Kompo soles, besides several lines of goods for the use of shoe manufacturers, and in addition to these, coated fabrics for the clothing trade, hospital sheetings, and artificial leather for the automobile and upholstering trade. We understand that a plan is under way to erect a three-story hotel, thus in part solving the housing problem for the employes of the company, and other improvements are in contemplation, though the plans are not yet sufficiently perfected to warrant publication.

* * *

Fred T. Ryder, the sales manager of the sole and heel business of the United States Rubber Co., started on a long trip the 17th of last month. His plans were to visit all the large cities between here and the Pacific Coast and interview the shoe jobbers on the advantages of rubber soles. Many shoe manufacturers have adopted rubber soles for some of their lines, now that sole leather has doubled or trebled in cost, and Mr. Ryder's trip is mainly to secure the coöperation of the shoe wholesalers in further popularizing the use of rubber and fiber soles on moderate priced soles.

* * *

The rubber and fiber sole industry is receiving increased attention at the present time. A new enterprise is that of the Fibrehide Manufacturing Co., which has built a factory at South Braintree, for the purpose of manufacturing a line of soles and heels. This factory, which is two stories high and measures 240 by 160 feet, is expected to be ready for operation by the time this letter is read. The machinery is now being installed. The product is to be a rubberized felt, or a compressed body of cotton-felted fiber and rubber, vulcanized by a special patented process. The soles are "died out" from the sheet, thus doing away with the expensive process of molding, as is common with most rubber and fiber soles, an obvious advantage as regards cost of production. Frederick T. Ryder, Jr., is president and manager of the company and A. S. Dexter, of the Dexter Rubber Co., South Braintree, is the treasurer.

* * *

Large advertisements have appeared in the Boston papers, calling attention to the Pneumatic Cushion Inner Tube Co., which is now being organized for the purpose of manufacturing an invention of James P. Brophy, formerly superintendent of the Boggs Rubber Co., Birmingham, Alabama. The tube is of novel construction, having a combination of transverse and longitudinal "bulkheads," which form air compartments or cells, all connected. These cells are inflated, giving the air cushion effect of an ordinary inner tube, but in case of deflation, the bulkheads are of sufficient strength to hold the resiliency, thus obviating the disagreeable necessity of replacing the inner tube on the road in case of accident. The tube is not yet on the market, but experimental sets have been run for more than a year with excellent service. The officers of the company are: President, George P. Brophy, treasurer of the automobile supply house of Brophy-Barrabee Co.; secretary and treasurer, Frank W. Hall, formerly general manager of the Boggs Rubber Manufacturing Co., of Birmingham, Alabama. James Brophy, the inventor of the tire, will be general manager of the new company.

* * *

The Batterman, Rood Rubber Co. is the name of a recent corporation, formed for the purpose of manufacturing rubber footwear. The capitalization is placed at $150,000. It is the intention of the company to make a certain line of footholds and light rubbers for women, which can be retailed at a low price. The plans are to market the product in a somewhat original way, and through other retail establishments than regular shoe stores. The factory at Framingham is in charge of Arthur A. Cushman, formerly of Bristol, Rhode Island. The officers of the company are: Warren B. Rood, president; Robert W. Daniels, vice-president, and Thomas H. Dumper, secretary and treasurer.

* * *

At the annual meeting of the Alfred Hale Rubber Co., recently held in Boston, the stockholders elected David A. Cutler, Richard C. Storey, William G. Williams, William D. Lamond and Francis H. Swift, directors. The directors elected David A. Cutler president and treasurer and Richard C. Storey vice-president and clerk, and also voted to increase the capital stock from $8,000

to $18,000, declaring a stock dividend of 125 per cent for this purpose. The business of the last year has increased over the past five years by 150 per cent, and the company is planning to increase its facilities very materially in the near future.

* * *

The Boston Woven Hose & Rubber Co., Cambridge, Massachusetts, plans to double its authorized common stock from $2,000,000 to $4,000,000.

* * *

The good ship "Hypatia," often referred to as the flag-ship of the Monatiquot Rubber Works Co., has been offered for war service to the government by her owner, James H. Stedman, treasurer of the company.

In case of necessity she will be assigned to the Scout Patrol fleet now being organized by the government, and made up of privately owned crafts. A power boat of the "Hypatia's" type is manned by a crew of five. She will carry a large gun forward and an anti-aircraft gun at the stern.

* * *

A number of young men employed in the branch store and the selling agency of the United States Rubber Co. in this city have formed a self-culture club, and will hold weekly meetings at the Boston Young Men's Christian Union building. The speaker on February 14 was W. E. Piper, superintendent of the Boston Rubber Shoe Co., Malden, who gave an instructive talk which was highly appreciated. At a later meeting Samuel S. C. Chilcote, assistant to President Hotchkiss of the General Rubber Co., spoke on plantation rubber. Mr. Piper succeeded Frank A. Locke as superintendent of the Boston Rubber Shoe Co.'s factories, when Colonel Locke was elected president of the Boston Young Men's Christian Union some years ago. Since then this latter institution has greatly broadened its field of usefulness and is doing splendid social and educational work, and much of this extension of influence must be credited to this ex-member of the rubber industry.

* * *

Norman W. Biggart, of Danbury, Connecticut, representative of the Mohawk Rubber Co., of Akron, Ohio, had an exciting experience on the morning of the 10th of last month when the Hotel Lenox of this city caught fire. Mr. Biggart occupied a room on the seventh floor, where his escape by the stairway was cut off. He was rescued, however, by firemen, who reached him by an aerial ladder and conducted him safely to the ground.

* * *

Another rubber man who had a similar experience was A. H. Kerr, of the Chicago, Illinois, branch of the United States Rubber Co. He was awakened by the roar of the fire, and when he opened his door, was met by the advancing flames. Going to the window, he threw out a pillow, to attract the attention of the firemen, who immediately placed a ladder to his window, so that he escaped without injury. Mr. Kerr is a salesman in the heel and sole department of the company, and attended a conference of that division in New York a few days previous.

THE RUBBER TRADE IN AKRON.

By Our Regular Correspondent.

THE policy of The B. F. Goodrich Co. to encourage national military training is practically demonstrated in the offer of this company to employ Akron soldiers who enlisted and went to the border, in case they find their places in business houses filled on their return home. The operating committee states that the Goodrich factory can take care of all the soldiers from Akron who are able to qualify physically.

The $10,000 prize given by the Goodrich company for the championship in driving contests throughout the year was recently awarded at the drivers' dinner at Chicago, Illinois, Dario Resta receiving the lion's share. Resta used Silvertown tires exclusively throughout the 1916 racing season.

C. E. COOK.

C. E. Cook has been promoted to an important post at the Akron factory, in connection with the direction and operation of the 120 branches and stores and their thousands of employes selling Goodrich products. Mr. Cook was formerly manager of the Pacific Coast territory. As an evidence of the esteem in which he was held there his associates gave him a dinner and presented to him an elaborate silver service.

* * *

The Firestone Tire & Rubber Co. makes the interesting announcement that at last a circus is to be motorized by the United States Circus Corporation at a cost of $1,000,000, and that the 100 3½-ton Kelly-Springfield trucks and 100 heavy Troy trailers necessary to move a six-ring show, together with the 1,200 persons, horses, menagerie and other miscellaneous paraphernalia are to be equipped with Giant single-tread solid tires. Never before has such an opportunity arisen to demonstrate conclusively the relative merits of single and dual tread tires for heavy transportation.

W. A. Bryan has been appointed to fill the recently created position of master mechanic at the Firestone factory. Mr. Bryan was formerly superintendent of the Akron motor truck plant of the International Harvester Corporation.

Two industrial fellowships in the study of the chemistry of india rubber have been established at the Municipal University of Akron, one by the Firestone Tire & Rubber Co. and the other by the Goodyear Tire & Rubber Co. These fellowships will yield $300 per year each and will be open to graduates of standard American colleges who have completed a thorough college course in chemistry and are recognized as students of excellent ability. By action of the directors of the university, the holder will be exempt from all fees and will render certain services in instruction and laboratory supervision. At the end of the year of work at the Municipal University the holder of the fellowship will enter the employ of the company which has provided the fellowship, with the advantage of the basic knowledge of rubber chemistry acquired at the laboratory of the university.

* * *

The American Rubber & Tire Co. has let the contract for a 108 by 40-foot, four-story building of steel and brick construction, up-to-date in every respect. This addition will be used for the general extension of all departments of the plant, especially for the manufacture of the company's "Triple A" pneumatic tire and for the cord tire recently added to its line.

The capital stock of the company has been increased from $500,000 to $1,000,000, $250,000 of which will be issued immediately. As this amount has already been provided for, the stock will not be offered to the general public.

* * *

At the recent annual meeting of the Akron Rubber Mold & Machine Co. the largest business in the history of the company was reported, and it was voted to buy further machinery and increase the production in 1917. The regular dividend was declared and officers reëlected for the ensuing year, as follows: S. W. Harris, president and general manager; W. E. Wilson, vice-president and assistant general manager, and G. F. Hobach, secretary and treasurer.

This company has purchased about eight acres of ground, besides two tracts adjoining the present plant, for enlargement purposes, but has not yet decided when to build on the newly acquired property.

The Miller Rubber Co. increased its total sales from $3,216,000 in 1915 to $7,583,605.95 in 1916 with prospects from $10,000,000 to $12,000,000 sales for 1917. The 1916 figures are for 15 months, owing to a change in the fiscal year.

The surplus on October 1, 1915, was $831,746.99. Earnings on October 1, 1915, to December 31, 1916, were $952,952 with a total of $1,784,699 less the common stock dividend of $1,000,000 depreciation and expenses of increased capitalization of $232,795.84 and dividends of $259,958. With a total of $1,592,753.94, the surplus on December 31, 1916, was $291,945.

The company will issue $500,000 in new common stock. Present shareholders will have the right to purchase shares of the new stock at par.

During 1916 the company doubled its factory and land holdings and is at present erecting a seven-story addition.

* * *

The admirable new plant of the American Hard Rubber Co., comprising buildings covering nearly ten acres, is equipped with the most modern machinery and appliances for the manufacture of hard rubber goods. The architect was Walter Kidde & Co., Inc., 140 Cedar street, New York City, who specializes in rubber mill construction.

* * *

At the annual meeting of the Amazon Tire & Rubber Co. the following officers were elected: L. J. Schott, president; L. F. Smith, vice-president; C. E. Bettler, treasurer; Dr. F. B. Richards and Albert Kroehle, directors, in addition to the officers. The company is building a standard pneumatic tire with an extra sidewall breaker strip or blow-out protection and reports a monthly increase in sales of about 140 per cent.

* * *

The Akron Biltwell Tire & Rubber Co., with executive offices at 405 Ohio Building, is having plans prepared for a new plant. The first unit will be four stories high, 100 by 200 feet, with power plant, the first story to be of reinforced concrete, fireproof construction. A large number of Cleveland people are stockholders in the new firm.

THE RUBBER TRADE IN RHODE ISLAND.

By Our Regular Correspondent.

MANUFACTURERS of rubber goods of every description in Rhode Island are working to capacity, with no apparent indication of cessation of the extraordinary demands.

The scarcity of desirable help still confronts the managers and is, perhaps, one of the most exasperating and ever present problems with which they have to contend. Because of this shortage several concerns, that would otherwise have built, have refrained from making additions to their plants. However, the aggregate output of the rubber factories of Rhode Island for the past two years has been something enormous, establishing a new record for the industry, and the end does not yet appear to be in sight.

* * *

The National India Rubber Co.'s plant at Bristol has been handicapped during the past few weeks on account of the congestion of freight, the local railroads having been utterly unable to move the accumulating output. The establishment is still engaged on an extraordinarily large order of tennis shoes and will undoubtedly be pushed to its utmost for a number of months to come.

* * *

A two-story brick addition is being built to the box shop of the Alice mill of the Woonsocket Rubber Co. at Woonsocket. When completed it will be used in the manufacture of paper boxes for packing the company's goods.

* * *

The Davol Rubber Co. is making extensive alterations in the three-story brick building at its plant in order to afford additional room for several departments.

The Mechanical Fabric Co., Providence, has recently discharged a mortgage of $28,000 held against its real estate by Lotta P. Kelley.

* * *

The Town Council of East Providence has voted to purchase 300 feet of fire hose for use of the town's fire companies. Of this 150 feet has been purchased from the Boston Woven & Rubber Hose Co., and 150 feet from the Quaker City Hose Co.

* * *

The BeSaw Tire Co., 50 Franklin street, Providence, is being conducted by A. C. Bartlett, according to information filed at the office of the city clerk.

THE RUBBER TRADE IN TRENTON.

By Our Regular Correspondent.

SIX men employed in the vulcanizing department of the Luzerne Rubber Co. narrowly escaped death, though unscathed, when one of the huge vulcanizers blew up, demolishing one entire wall of the building and shattering windows in another factory some distance away. The only explanation that has been made is that there must have been defective metal in the vulcanizer. It was not an old apparatus and those in charge claim that everything was apparently in good order a short time before the accident. While the damage done to the building is considerable, the chief concern of the company is to get things in shape for turning out of orders, as the plant is rushed with business.

* * *

The Empire Rubber & Tire Co. is to be reorganized under the name of the Empire Tire and Rubber Corporation, with a capital stock of $6,000,000, of which $1,500,000 is preferred, $3,000,000 common, issued, and $1,500,000 reserved in treasury for converting preferred.

* * *

The Globe Rubber Manufacturing Co. recently awarded a contract for a large brick addition to its plant on Prospect street.

* * *

Efforts are being made by the Trenton Chamber of Commerce to have the Ford Motor Co. locate a plant in Trenton. This action follows the decision of Henry Ford to not erect a plant at Harrison, New Jersey, as he had contemplated doing. Rubber tire manufacturers are interested in the outcome of the negotiations.

* * *

The Automobile Owners Co-operative Association, organized in this city to supply tires to members, is said to be contemplating the equipment of a factory for making tires. It is said there have been large numbers of near-by motorists to subscribe for stock in the concern.

* * *

The Trenton Automobile Show will be held in the Second Regiment Armory from March 21 to 24, inclusive. Tires and other rubber goods will be elaborately displayed in the section devoted to automobile accessories.

A SYNTHETIC RUBBER ENTERPRISE.

The latest synthetic rubber proposition has been launched in Tacoma, Washington, by Morton Gregory, who proposes to produce rubber from Puget Sound products.

Mr. Gregory, who has been experimenting for several years, claims that the feasibility of his process has been demonstrated in a number of laboratories during the past year. He has leased 3,800 square feet of municipal dock property on which to conduct his operations. It is stated that the project has been adequately financed by eastern capital.

TIRES CARRY MORE THAN STEEL RAILS.

RUBBER-TIRED vehicles provided a passenger and freight service in the United States estimated at $1,725,000,000 for the year 1916, a total so enormous that more and better highways now constitute the greatest transportation need in America. This conclusion was based upon the startling figures presented by Alfred Reeves, general manager of the National Automobile Chamber of Commerce, at the highway engineering meeting held in New York, December 28. They show that automobiles are now rendering a greater passenger transportation service than all the steam railways of the country, or than all the urban and interurban electric roads combined, and that the automobile freight traffic is also assuming enormous proportions.

According to the Bureau of Railway Economics the steam railroads carried 1,053,000,000 passengers in 1914, with little increase in 1916, an average distance of 33 6/10 miles, or a total of 35¼ billion passenger miles, and earned a revenue of $700,400,000 on this service. By comparison, the 3¼ million passenger automobiles now registered in the country, averaging 5,000 miles a year, and three passengers per car, gave a service of 48¾ billion passenger miles, worth 975 million dollars on the railroad basis of two cents per mile, or over 200 million more than the railroad passenger service.

The street and electric railroads carried 9½ billion passengers in 1912 (the latest year for which official figures were available). The average distance traveled was four miles, making 38 billion passenger miles. This produced a little more than half a billion dollars, averaging 1⅓ cents a mile. At this rate of fare, the automobiles rendered a service this year of 598½ million dollars, or about 98 million more than the street railways.

The 250,000 commercial motor vehicles in the country, averaging 50 miles a day, half the distance with an average load of two tons, give a total of 3¾ billion ton-miles annually. Taking 20 cents per ton-mile as a fair average cost of hauling by horse-drawn vehicle on the public roads, this is worth 750 million dollars a year.

SCALE FOR WEIGHING TIRE CASINGS.

A convenient accessory to facilitate the weighing of tire casings is shown here in connection with a hanging scale. This consists of a hook of sheet metal, so formed as to receive readily and firmly hold the tire. The scale, which is of the "no spring" variety, is furnished with a 100-pound chart graduated to quarter-pound divisions, or with a 50-pound chart having two-ounce graduations if preferred. The entire arrangement can be so placed at some convenient point on the shipping room wall, that the adjustment of the tire and the reading of the register are almost instantaneous. [Toledo Scale Co., Toledo, Ohio.]

PORTABLE TUBE VULCANIZERS.

Two very light and simple tube vulcanizers of the pocket variety have been offered to the motorist trade recently. In appearance they resemble nothing more than an ordinary clamp, the upper jaw of which forms the heating pan, while the clamp is tightened on the part to be repaired by a thumb screw.

LOW'S FIVE MINUTE VULCANIZER.

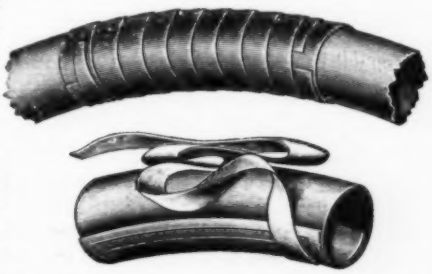
In the Low vulcanizer the heat is furnished by a disk of cardboard saturated with a combustible which, when placed in the pan and ignited, will burn without flame, and produce the correct heat for curing. The Marvel Junior uses a composition fuel tablet that burns slowly, yet radiates sufficient heat to cure the repair properly.

MARVEL JUNIOR VULCANIZER.

KEYSTONE ADJUSTABLE BLOW-OUT PATCH.

This blow-out patch is made of rubber and fabric, and, it is claimed, eliminates the common difficulty caused by the tire swelling after a patch is placed over the crack and thereby gradually forcing the patch through the hole by the pressure of the inner tube. This improved tire accessory, which has recently been patented, is applied as follows:

The inner tube is blown up to its normal size, which will nearly fit the inside of the casing, as is customary when inserting the inner tube at any time. The patch is then put on the inner tube and the strip which will be seen in the illustration is wrapped around the patch, which is then put in the casing over the crack and the tire put on the rim as usual. When the tire is inflated, the blow-out patch, if not backed enough to fit the tire, will allow the strip to unwrap until the patch comes in contact with the inside of the casing and the pressure of the patch against the casing prevents it from unwrapping any further. In this manner the inner tube is tied down and the pressure is taken off of the casing and is on the patch instead, and therefore will not cause the tire to swell.



These patches are supplied in three sizes: No. 1 fits a 3 and 3½-inch tire; No. 2 fits 4 and 4½-inch tires, and No. 3 fits 5 and 5½-inch tires. [Keystone Rubber Manufacturing Co., Erie, Pennsylvania.]

The addition to the shipping department of the Pennsylvania Rubber Co., Jeannette, Pennsylvania, now in process of erection, will double its capacity and assure the prompt and efficient handling of the company's rapidly growing business.

The Birch-Hintz Manufacturing Co., maker of "Birch" pump valves, rubber molds and machinery for rubber factories, is now located in its new factory building at 1000-1100 South Kilborn Avenue, Chicago, Illinois.

The Rubber Trade in Great Britain.

By a Special Correspondent.

NOT for several years has the winter been so severe and inclement. The rivers have been frozen, and the snow deep and lasting. This has caused a heavy demand for galoshes, and, at the present time a scarcity which is very discouraging to dealers. The streets have been in an execrable condition for weeks, and the run on overshoes is extraordinary. Indeed, one dealer reports having sold over 1,000 pairs in a single day. Many dealers sold their entire stocks and could not restock, but others were able to get Canadian or United States goods. The latter, though 50 to 75 per cent higher in price (at the retail shops) than British made overshoes, do not wear so long, because the Americans sacrifice durability for appearance. It must be confessed that the imported shoes are more attractive.

Rubber footwear manufacturers have been and are now running their works to the utmost capacity, mainly on government orders. Trench boots, overshoes and overboots are absolutely essential to our brave men at the front. Whilst our manufacturers have been so engaged, it has been necessary to import civilian galoshes, and hundreds of thousands of cases of these have come from American manufacturers, who are also capturing the foreign trade which our manufacturers cannot supply, whilst their whole output is taken up for war requirements. When the war is over and the government war orders cease, our manufacturers will have a strong fight to get back the business which has been captured by foreign competitors.

MECHANICALS EXPORTS SUFFER.

The same situation is noted in the export of mechanical rubber goods and asbestos packing to Latin-American countries. As an example, it is stated that the importations of rubber and asbestos packing and mechanical goods by Brazil and Argentina during the five years immediately preceding the war were:

	Kilos.	£ Sterling.
1909	243,766	15,422
1910	282,946	17,974
1911	258,599	17,061
1912	353,779	20,452
1913	367,958	22,535

Of this trade Great Britain supplied some 45 per cent, Germany following with 40 per cent, Belgium with 5 per cent, and the United States with less than 3 per cent. Since the war the position has been entirely changed; of German exports there remain scarcely any, while the United States, profiting by the situation, has increased its trade with Argentina and Brazil by some 200 and more per cent.

PROOFING TRADE GOOD.

The proofing trade has been excellent also. This is particularly the case with those works where government orders are being filled. Especially busy are those who are proofing fabric for balloons and aeroplanes. This class of fabrics requires the highest quality of workmanship and material. Then the orders for trench capes and ground sheets for the government have monopolized the entire capacity of the works. Complaints are not rare that while the government practically commandeers the whole output, there are doubts about renewals when present contracts are completed.

Fears are entertained that cloth for proofing may become scarce. This may not be unfounded, but with the large importations of cotton, it would seem that such scarcity could not be because of want of raw material. The lack of labor in the textile works due to enlistments has greatly affected the output. This may be relieved to some extent in the Manchester district by the agreement between the labor unions and the Federation of Master Cotton Spinners Association whereby during the continuance of the war the rules may be relaxed to the extent that females and youths may work in some branches.

PETROL CONSERVATION.

Tire people are worrying over the new rulings of the Petrol Committee which has refused to renew all full duty motor spirit licenses unless the holders are engaged in work of national importance in which continued use of the motor car or motorcycle is essential. Licenses now in force hold good until March 31 for motorcycles and till April 30 for private cars. On February 7 the use of petrol for char-a-bancs was prohibited. It is feared that this action will completely abolish pleasure motoring, and curtail the use of motor cars by business men to a great extent. In such case the tire industry must naturally suffer.

DUNLOP'S PROSPEROUS YEAR.

However, the tire business is not yet in the dumps, if one may consider that the net profit of the Dunlop Rubber Co., Limited, for the year 1916 was £432,400, the allocations £227,000, and the carry-forward £82.900. And besides this the company paid dividends of 15 per cent. The company found great difficulty in maintaining its labor force. The scope of the company's business had been widened, they had paid greatly enchanced wages, salaries and working expenses generally, without raising retail prices.

WORKING OVERTIME.

All the tire concerns report good business, the government orders more than making up for any falling off in civilian demand. Not only the tire factories but many in general lines are working to double capacity by employing double forces. A specially notable case is that of the Midland Rubber Co., whose works remain inoperative but six hours in the week. This stoppage is from noon till six at night on Saturdays. The works are running continuously, Sundays included, the rest of the time.

COMMERCIAL FAIRS.

The British Industries Fair is to be held at the Victoria and Albert Museum, and at the Imperial Institute Building from February 26 to March 9. In view of the risk of interference with the output of munitions of war, it has not been possible to include in this fair certain trades which otherwise would have been invited to participate. The rubber trade is one which is thus excluded. The trades represented are the same as a year ago, namely toys and games; earthenware and china; glass; fancy goods; stationery and printing. A new and important development in this matter is the adoption of the fair principle by the municipality of Glasgow, on the same dates when the fair will be held there. The fair in Glasgow, which is to be held under the auspices of the Board of Trade of that city will be confined to textiles; ready made clothing; boots and shoes; foodstuffs; and domestic chemicals. Over 100,000 invitations to attend both fairs have been sent out to buyers in these trades.

MOTORCYCLES SOLD WELL.

In re the petrol curtailment, a side light on its effect is in the matter of motorcycles. Operatives in many lines of industry have been earning larger wages, and the consequence has been a wonderful increase in the sales of motorcycles, many ordinary workpeople buying them to save tramcar fares. Now that their licenses are refused renewal, and they are unable to get petrol for motive power, the machines must remain useless, unless some substitute is obtainable. Here is a chance for some of your American inventors to come to the rescue.

The general opinion is that the war cannot last through the present year, and with this in view plans are being discussed for readjustment of wages. The Chamber of Commerce recommends the following:

As regards the remuneration of employes, the principle of payment by results should, as far as possible, be adopted by employers and employed.

The basis of rates of payment for labor should involve such a scale as will insure for all willing and efficient workers a fair and reasonable standard of living.

The government should afford opportunities for considering the amendment of the trade disputes acts and of any provision of the factory and workshop acts other than those relating to the health of the workers.

Encouragement should be given, as far as possible, to profit-sharing and co-partnership agreements, or premium and bonus systems on lines which have proved beneficial to employers and employed in the past, subject to the special conditions of particular trades, and to the maintenance of the standard rates of wages.

CHEMICAL MANUFACTURERS ORGANIZE.

The Association of British Chemical Manufacturers has recently been organized to promote coöperation between manufacturers of chemicals and other allied products, to develop technical organization, to promote industrial research, efficiency and advancement. The management consists of twenty, and there are committees of various divisions. Group 8 treats of cellulose products, rubber and substitutes, and Group 5 distillation of coal shales, coal tar primary products. I have not been able to obtain the names of the committees of these groups up to time of writing.

LONDON AS A RUBBER MARKET.

THE following significant paragraph under the heading above, which is reprinted from "The India Rubber Journal" of January 27, indicates that British rubber associations are alive to the recent trend of the trade and may advocate stringent measures to protect London's prestige as the world's great rubber market:

The growth of direct shipments from the Straits and Ceylon to the U. S. A. has been watched by the London rubber market with some alarm, though the view has been confidently expressed in some quarters that London, because of its financial power, will reassert its superiority as a rubber center after the war. The exchange difficulty now manifesting itself in the East may be the straw which shows the direction the wind is blowing. The fact should not be lost sight of that the government have it in their power to divert the whole trade in British-grown rubber so that it passes through London and Liverpool. For various reasons this may be found expedient, and we shall not be surprised if it comes about.

AUSTRALIAN "HOMING" MOTOR TIRES.

Under this title the January 1, 1917, issue of the weekly bulletin of the Canadian Department of Trade and Commerce publishes an interesting article on the use of fiber tires for emergency purposes in Australia.

As in all other countries of vast distances and comparatively few traveling facilities, the advent of the motor car in Australia has, to a very considerable extent, solved the difficulties of transportation. In many parts of the country the roads are merely bush tracks or overland stock routes, on which herds of cattle are driven long distances to the city markets or coastal freezing works.

The rough nature of the country over which automobiles have to travel and the excessive heat often experienced have made the cost of rubber tires a serious item in maintenance, thereby causing many experiments to obtain a substitute for rubber at a moderate cost. The invention and recent perfection of the Australian "homing" tire is claimed to have met the emergency at a comparatively small cost. Tests with tires made of various kinds of fiber were carried out, with the result that coir fiber was found to be the most suitable for the purpose because of its lightness, cheapness, resilience, and durability. The greatest difficulty was to discover a method of joining the ends of the rope to make a complete circle of the same size, but eventually a new splice was invented, and the tire as now sold in Australia is said to be perfect of its type.

When first placed on the market the "homing" tire was sold as an emergency tire in case of a puncture or blow-out, but it proved so satisfactory that in the country districts of some of the states the rope tires are frequently used on all the wheels of automobiles, particularly for station or ranch work and over rough and stony country.

The tires are bullet, nail and glass proof, and if a speed of 16 miles per hour is not exceeded it is claimed that they are almost as soft riding as pneumatic tires. It should be understood that the "homing" tire takes the place of both inner tube and cover, being attached to the rim by four or five straps.

THE RUBBER TRADE IN GERMANY.

By Our Regular Correspondent.

IN the bitter struggle for existence in which Germany is now plunged, it is difficult to write freely. One would like to do so, but one never can tell how vitally important some apparently innocent information may be. However, I believe that no secrets will be violated in telling you that those of our industries that have been working on government orders have, notwithstanding large contributions to war loans and various relief funds, made enormous profits, and that this "boom" period is being utilized for the purpose of carrying on vast mergers. Some of the industrial profits for the fiscal year 1915-16 were astonishing. The net profit of 19 representative rubber companies was 12,000,000 marks [$2,756,000], against 10,000,000 marks [$2,380,000] the year before. When this war comes to an end our rubber industry will be possessed of greater organization, efficiency and wealth than ever before, and we believe we know how to see that it will not lack raw materials. This brings me to synthetic rubber.

SYNTHETIC RUBBER.

As I have written repeatedly, I do not believe that synthetic rubber will remain an important factor when peace is reëstablished. Our non-technical papers derive much satisfaction from the sarcasm they exercise in thanking our enemies for forcing

Underwood & Underwood, New York.

SPRING WHEELS USED ON GERMAN AUTOMOBILES.

us to develop rapidly an invention which otherwise might have grown only slowly in the course of ages; but the fact remains that synthetic rubber is very costly and only suitable for a limited number of purposes. For tires, for instance, I do not believe artificial rubber will ever be able to compete with the natural product, and my belief is sustained by the number of bicycle tire substitutes which are offered and which contain no synthetic rubber, in fact any kind of rubber. The substances

most used are steel wire, leather, wood, prepared canvas, rubber substitute, and combinations of these substances.

WIRE TIRES.

The wire tire is made of steel wire, about 3/16 inch thick, which is worked into a very close coil, the two ends being welded together, so as to give it the proper shape. This product now sells wholesale at 12 marks [$2.86], and retails at 18 marks [$4.28], which is considerably more than the average price for rubber cycle tires just prior to the war. Besides its high price, the steel-coil tire has the additional objection that it cuts into the roads, is far less resilient than pneumatics, and is very noisy in use. Some users are said to have overcome the latter objection by inserting a layer of felt between the rim and the tire, but this certainly adds much to the cost of the tires.

WOODEN TIRES.

Wooden cycle tires, due to their low cost, have met with fair success. There are various types of these and they retail at from 4 to 6 marks [$0.95 to $1.43] apiece. Some are in one piece, others are sectional. The Continental Caoutchouc und Gutta-Percha Compagnie, of Hanover, is producing sectional wooden tires that are meeting with marked success. They are composed of 47 parts, which include 12 wooden tire sections of 3 different kinds, 12 tin plates, 12 screws, 10 connecting pins, and one thumbscrew. The tin plates are used to secure the sections to the rim, which must be of metal itself; the screws serve to attach the tin plates to the ends of the wooden sections; the connecting pins hold the sections together, and the thumbscrew is on a spindle put through the valve hole in the rim and is used to tighten the tire on the rim. This special type sells retail at 6 marks [$1.43], which would be exceedingly satisfactory if it represented the whole cost to substitute rubber tires. In reality the expense is more than double, for in order to obtain reasonably easy riding qualities, the fork of the cycle has to be provided with shock absorbing springs, which are marketed by the Continental company and which retail at 7.50 marks [$1.78]. This places the total cost of a set of tires at 19.50 marks [$4.64].

Another type of wooden tire is made of one piece of wood, the outer surface of which is covered with a narrow strip of leather. Between the inside surface of the wooden tire and the rim several steel springs are placed, with a view to providing some elasticity. In addition to this both front and rear forks of the cycles are of the "cushion frame" type, provided with large, shock-absorbing steel springs. The cost of this outfit, including the two tires and the large springs, is 36 marks [$8.57].

LEATHER AND CANVAS TIRES.

Several leather-covered and canvas-covered tires are made and sold. These are solid, the outer casings being of leather or prepared canvas, and the inner part consisting of wood and similar substances. To make this type of tire more durable, a steel tread is often provided. Prices for these tires vary; one fairly good leather-covered tire retails for 48 marks a set [$11.42]; another for 70 marks [$16.66].

"LOBO" TIRE.

The tire that has the strongest claim to being a real substitute for the rubber article is marketed under the trade name of "Lobo." It is the product of the Kunstgummi Gesellschaft, m. b. H. (Artificial Rubber Co.) of Chemnitz, Saxony, and is composed of 2 parts, corresponding to the inner tubes and outer casings of peace times. The inner part, which is the most important, is solid and is covered with cloth made into the shape of a tire. The tube thus formed is filled with a preparation in the nature of rubber substitute. The casing is built up of prepared canvas, and wears tolerably well. The price for a set of these tires is 52 marks [$12.38], and is of course sufficient to restrict their use, so that it can be said that of all the cycle tires now offered and used, the sectional wooden tire of the Continental company is the most practical from the point of view of both price and service.

RUBBER PLANTING NOTES.

CEYLON RUBBER AUCTIONS POSTPONED.

REPORTS recently received give every indication of at least a temporary derangement in the financial transactions of this locality, caused by certain restrictions imposed by the India Council, thereby seriously impeding business in general, and further resulting in the postponement of the rubber sales.

It is generally expected, however, that immediate remedial measures will be adopted. Efforts are being made to place the labor situation on a more satisfactory basis than it has been for some time past.

CEYLON REPORT FOR 1915.

The Ceylon Report for 1915 has just been issued.

The year 1915 witnessed a considerable increase in the output of crude rubber, as young plantations came into bearing, and older ones increased their yield through better cultivation and tapping.

The area under *Hevea* rubber was approximately 240,500 acres, almost entirely in the hands of European planters, and ranged from sea level to 2,000 feet. Few new plantings were made, owing to lack of suitable available land, as *Hevea* does not thrive in the dry northern districts of the island, even under irrigation.

By far the greater amount of rubber was shipped as crêpe, though a certain amount of smoked sheet and biscuit was also made. Prices ruled satisfactorily throughout the year, the average price being 1.65 rupees [54 cents] per pound.

Experiments in the upbringing of plantations with green manure, seed selection, wide spacing, artificial manuring, and the best methods of tapping were carried out. Experts were engaged in research work connected with the physical problems concerning the tree, the latex, and rubber, and with the fungus diseases attacking plantation *Hevea* trees, which were somewhat serious in the wetter districts.

EXPORTS.

Exports of crude rubber constituted a record, the quantity being 43,574,800 pounds for 1915.

The United Kingdom and the United States continued as the principal buyers, their purchases being 55.12 per cent and 39.72 per cent respectively of the total, as against 62.9 per cent and 23.19 per cent in 1914.

Besides the United States, France, and Russia, the only other foreign country to be supplied was Japan, due to restrictions necessitated by the war.

EXPORT DUTY.

Under Ordinance No. 17 of 1869, as amended by Ordinance No. 5 of 1914, the export duty levied on crude rubber from October 1, 1915, is 7.50 rupees [$2.48] per 100 pound.

IMPORTS OF RUBBER GOODS AT HAIKWAN, CHINA.

The Chinese Imperial Customs have just issued a volume giving the countries of origin of the principal imports into China during 1914-15. The following are the Haikwan imports of manufactures of rubber and gutta percha:

From—	Haikwan 1914.	Haikwan 1915.	Haikwan Increase or Decrease.
Great Britain .....*taels*	40,000	31,000	— 9,000
Germany	9,000	.....	— 9,000
France	14,000	21,000	+ 7,000
Russia	186,000	90,000	— 96,000
Japan	47,000	202,000	+ 155,000
Other countries	34,000	41,000	+ 7,000
Totals	330,000*	385,000	+ 55,000

* Includes 58,000 Haikwan taels reëxported.

[The legal value of the Haikwan tael is .807 cents United States currency.]

Recent Patents Relating to Rubber.

THE UNITED STATES.

ISSUED JANUARY 23, 1917.

NO. 1,213,160. Breathing bag. R. H. Davis, London, England.
1,213,215. Apparatus for cleaning tobacco pipes comprising a rubber bulb, tube and washer. S. Kuprel, Bridgeport, Conn.

1,213,256. Anti-skidding device. T. A. Pyros, Pittsburgh, Pa.
1,213,290. Non-skid tire chain. C. R. Standley, Boone, Iowa.
1,213,370. Bat comprising a rubber cushion. J. A. Hillerich, assignor to Hillerich & Bradsby Co.—both of Louisville, Ky.
1,213,476. Pneumatic tire shoe. C. F. A. Gray, Montreal, Quebec, Canada.
1,213,557. Cushion tire. J. T. Trotter, New York City.
1,213,571. Combined bathing-cap and suit-bag. J. Zuckerman, New York City.
1,213,606. Breast pump. J. T. Emott, Morristown, N. J., assignor to Puritan Chemical Co., a corporation of Massachusetts.
1,213,697. Inner tube for pneumatic tires. B. C. Seaton, Nashville, Tenn.
1,213,719. Cushion tire. J. F. White, Pittsburgh, Pa.
1,213,725. Fountain pen. O. B. Anderson, Elizabeth, N. J., assignor to Eagle Pencil Co., New York City.
1,213,726. Impregnated coil and method of making same. L. H. Baekeland, Yonkers, N. Y., assignor to General Bakelite Co., New York City.
1,213,735. Air-tube for a pneumatic tire. H. Brown, Putney Hill, London, England.

ISSUED JANUARY 30, 1917.

1,213,814. Teat cup for milking machines. G. O. Anderson, Lancaster, Pa.
1,213,834. Elastic wheel tire. R. Bunzlau and C. L. Stoll, assignors to the Firm "Sembusto" Elastische Radbereifungen Gesellschaft M. B. H.—all in Vienna, Austria-Hungary.
1,213,949. Anti-skidding grip-tread for vehicle wheels. C. Reger, Danville, Pa.
1,213,950. Cushion for billiard tables. E. Ringsmith, Morenci, Ariz.
1,213,951. Recoil pad for gun butts. E. Ringsmith, Morenci, Ariz.
1,213,967. Tire tool. M. H. Stewart, Detroit, Mich.
1,214,004. Tire valve. J. A. Bowden, Los Angeles, Calif., assignor to A. Schrader's Son, Inc., Brooklyn, N. Y.
1,214,028. Toy mustache with rubber part. F. H. Hainert, Jr., Minneapolis, Minn.
1,214,065. Rubber pad for the soles and heels of boots and shoes. W. W. Phillips, London, England.
1,214,072. Fountain drawing pen. T. J. M. Reynders, Rotterdam, Netherlands.
1,214,087. Self-filling fountain pen. M. Shemin, Bayonne, assignor to J. L. Valentine, Jersey City—both in New Jersey.
1,214,137. Resilient tire. L. E. Clawson, San Francisco, Calif.
1,214,155. Tire. C. W. Guttzeit, New York City.
1,214,174. Resilient tire. L. H. Klocksiem, Paton, Iowa.
1,214,268. Air bag for mending pneumatic tires. J. W. Blodgett, Chicago, Ill.
1,214,273. Tire protector. J. R. Cabanne, Seattle, Wash.
1,214,291. Cushion tire. F. Fitzharris, assignor of one-half to E. J. Nixon—both of Texarkana, Tex.
1,214,310. Fountain pen. S. Josselyn, Atlantic, assignor of one-half to S. C. Crocker, Boston—both in Massachusetts.
1,214,321. Pneumatic tire. W. E. King, Topeka, Kans.
1,214,478. Life saving suit. G. W. Magnus and J. O'Banion, Seattle, Wash.

ISSUED FEBRUARY 6, 1917.

1,214,537. Metal-studded tire. J. R. Gammeter, Akron, Ohio, assignor to The B. F. Goodrich Co., New York City.
1,214,543. Elastic webbing hose supporting garters. M. B. Hammond, assignor to The Thomas B. Taylor Co.—both of Bridgeport, Conn.
1,214,566. Resilient tire. G. F. Mallaby, East Cleveland, Ohio, assignor to Kelly-Springfield Tire Co.
1,214,666. Composition sole for boots and shoes. J. A. Ford, Jamaica Plain, assignor to Plymouth Rubber Co., Canton—both in Massachusetts.
1,214,670. Pneumatic tire comprising a breaker strip of soft rubber mixed with shredded fiber. W. C. Geer, Akron, Ohio, assignor to The B. F. Goodrich Co., New York City.
1,214,777. Anti-skid device for wheels. C. G. Greenleaf, West Richfield, Ohio.
1,214,781. Pneumatic tire pressure gage. C. Harrison and K. Lamond, assignors to Vancouver Motors Supply, Limited—all of Vancouver, British Columbia, Canada.
1,214,807. Rim tool for automobile rims. G. E. Lundberg, Kewanee, Ill.
1,214,811. Pneumatic vehicle wheel. L. Mayolino, assignor to Ruedas y Neumaticos Mayolino—both of Habana, Cuba.
1,214,830. Moisture-proof switchboard cord. W. L. Runzel, assignor to Runzel-Lenz Electric Manufacturing Co.—both of Chicago, Ill.
1,214,889. Sole for rubber shoes. S. W. Bourn, Providence, R. I.
1,214,959. Illuminated fountain pen. E. O. Schaffer, Derby, Conn.
1,215,050. Hose coupling. F. X. Muller, assignor to Republic Hose Coupler Corporation—both of Buffalo, N. Y.
1,215,064. Semi-metallic sheet comprising asbestos fiber, rubber, shredded metal and a filler. L. L. Ryan, assignor to The Royal Equipment Co.—both of Bridgeport, Conn.
1,215,111. Cascade fountain for internal baths. E. Carlsen, Chicago, Ill.
1,215,179. Anti-skidding attachment. A. Montanari, Pensacola, Fla.
1,215,216. Non-skid tire. J. L. Swartz, Akron, Ohio.
1,215,301. Portable track and tire protector. J. B. Munson and P. F. Hagerty, Phillipsburg, N. J.
1,215,311. Bathing cap, embodying a flexible water proof body and a band of sponge rubber. Thomas W. Miller, assignor to The Faultless Rubber Co.—both of Ashland, Ohio.

ISSUED FEBRUARY 13, 1917.

1,215,349. Tool for repairing tires. C. Dierig, Lawrence, Mass.
1,215,382. Art of making mottled rubber flooring. A. B. Kempel, Akron, Ohio, assignor to The B. F. Goodrich Co., New York City.
1,215,449. Rubber soled shoe. M. W. White, Cliftondale, Mass., assignor to United Shoe Machinery Co., Paterson, N. J.
1,215,450. Rubber sole shoe. M. W. White, Cliftondale, Mass., assignor to United Shoe Machinery Co., Paterson, N. J.
1,215,475. Apparatus for nasal douches, injections and other like purposes. W. G. Brokaw, Paris, France.
1,215,486. Vehicle wheel tire. M. Clark, Chicago, Ill.
1,215,538. Eraser for fountain pen caps. W. W. Ihne, Chicago, Ill.
1,215,577. Cushion tire. L. R. Reeder, assignor of one-half to W. J. Quillen—both of Akron, Ohio.
1,215,582. Tire repair plug. R. W. Sampson, Melba, Whitestone, N. Y., assignor of one-half to L. Schwab, East Orange, N. J.
1,215,717. Pneumatic tire. A. F. Ruthven, Kansas City, Mo.
1,215,719. Tire plug. R. W. Sampson, Melba, Whitestone, N. Y., assignor of one-half to L. Schwab, East Orange, N. J.
1,215,782. Tire signal pressure-gage. G. F. Diamond and E. T. Richards, Kingston, N. Y.
1,215,861. A composition of matter composed of cameta, caucho ball, and accra flake, for sealing pneumatic tubes. A. J. Rheubottom, New Albany, Ind.
1,216,077. Automobile mat of rubber. E. A. Cohen and C. C. Colyer, Pittsburgh, Pa.
1,216,240. Demountable rim. F. Lowe, Cambridge, Mass.
1,216,244. Polishing roll comprising a body portion of rubber. A. McDowell; I. McDowell, administratrix of A. McDowell, deceased, assignor to V. H. McDowell—all of Lynn, Mass.

THE UNITED KINGDOM.

PATENT SPECIFICATIONS PUBLISHED.

In order to give the public the advantage of having abridgments of specifications up to date while retaining their numerical sequence, applications for patents made subsequent to 1915 are given new numbers when their complete specifications are accepted, or become open to public inspection before acceptance. The new numbers start with No. 100,001 (without any indication of date), and supersede the original application numbers in all proceedings after acceptance of the complete specifications.

[ABSTRACTED IN THE ILLUSTRATED OFFICIAL JOURNAL, DECEMBER 30, 1916.]

12,957 (1915). Gutta percha and rubber in armor construction for ships' fenders, etc. E. Sherring, 6 Birch Lane, Longsight, Manchester.
12,998 (1915). Pneumatic tire. J. Donkin, 58 Porchester Road, Bournemouth, Hampshire.
13,041 (1915). Cushion tire with sponge rubber filler. J. Guerrero, 6 Square de Messine, Paris.
102,025. Respiratory appliances. R. H. Davis, 187 Westminister Bridge Road, London.
102,040. Artificial foot with two rubber buffers at the ankle joint. E. Ernst, 80 Charlotte street, Fitzroy Square, London.

[ABSTRACTED IN THE ILLUSTRATED OFFICIAL JOURNAL, JANUARY 10, 1917.]

13,240 (1915). Overboot, New Liverpool Rubber Co., 292 Vauxhall Road, Liverpool, and I. W. Davies, 38 Whitham avenue, Great Crosby, Lancashire.
13,257 (1915). Divers' dress. F. W. Walters, Manukau Road, Auckland, New Zealand.
13,290 (1915). Tire inflating valves. M. S. Stevenson, 119 Victoria street, Westminister.
13,371 (1915). Seat cushions containing inflated rubber balls for increasing the buoyancy of boats, rafts, etc. A. F. Emeric de St. Dalmas, "Tacotena" Lansdown Road, Sidcup, Kent.
13,397 (1915). Device for supporting weak or damaged parts of tires. G. H. Broughton, 176 Montrose avenue, Toronto, Ontario, Canada.
13,464 (1915). Tire comprising an inner tube, wood casing and rubber tread. C. H. Southall, 7 Vicker's avenue, Kirkstall, Leeds.
13,470 (1915). Vulcanized india rubber ball. J. Liddle, 154 St. Vincent street, Glasgow.
13,490 (1915). Massage and exercising apparatus. A. J. Bergonié, 6 bis Rue du Temple, Bordeaux, France.

Chemical Patents will be found on page 327. Machinery and Process Patents on pages 331-333.

13,543 (1915). Inflatable mattresses. G. Caselli, 129 St. George's Road, Southwark, London.

102,075. Hot water bag of special shape. G. E. Skliros, 289 Regent street, London.

102,088. Pencil sharpener and point protecting rubber eraser. W. St. A. F. Hubbard, 29 Burges Road, East Ham, London.

102,108. Continuous inflatable life belt of rubber. H. B. Rogers, 6 College Gardens, Carleton Road, Tufnell Park, London.

102,123. Life saving suit. S. D. Wills, Fort Payne, Alabama, U. S. A.

[ABSTRACTED IN THE ILLUSTRATED OFFICIAL JOURNAL, JANUARY 17, 1917.]

13,722 (1915). Inflatable life belt. H. L. Roberts, 28 Alcina avenue, Toronto, Ontario, Canada.

13,745 (1915). Inner tube. H. C. Boggs, Dixie Cotton Chopper Co., Decatur, Alabama, U. S. A.

13,758 (1915). Inflatable rubber back and shoulder pads for use when carrying packs. J. A. Pugh, 17 Richmond Crescent, Cardiff.

13,764 (1915). Process of printing on china comprising a rubber-covered inking roller. R. S. Bennett, Kendor, May Bank, Stoke-on-Trent, Staffordshire.

13,799 (1915). Rubber insulated conductor for ignition systems of internal-combustion engines. O. D. North, 76 Elm Park Mansions, Park Walk, Chelsea, London.

13,905 (1915). Hard rubber covered metal non-skid studs for tires and footwear. W. T. Clifford-Earp, Marjoriebank, Barnes, London.

102,170. Rope tread band for tires. B. P. Gray, Ellangowan, Bishop's Road, Sutton Coldfield, Warwickshire.

102,193. Rebuilt tire. C. D. McGiehan, 2 Peasall avenue, Jersey City, New Jersey, U. S. A.

[ABSTRACTED IN THE ILLUSTRATED OFFICIAL JOURNAL, JANUARY 24, 1917.]

14,007 (1915). Marine life-saving collar. W. G. Brokaw, Highpoint, North Carolina, U. S. A.

14,072 (1915). Life-belts. W. H. Harding, Shottermill, Haslemere, Surrey; G. H. Leaver, 45 The Pantiles, Tunbridge Wells, Kent.

14,115 (1915). Block tire. C. A. Simmons, 981 Broadway, Albany, New York, U. S. A.

14,173 (1915). Detachable rim. J. H. Coffey and J. H. Coffey, 73 Jameson avenue, Toronto, Ontario, Canada.

14,213 (1915). Rubber jointed dolls, models, etc. A. P. F. Ritchie, Queensbury place, London.

14,229 (1915). Waterproof garment with special ventilation. C. F. Glenny, 152 Strand, London.

14,233 (1915). Portable telephone set rendered waterproof by rubber solution. International Electric Co. and R. G. Le Noir, 111 Salisbury road, Kilburn, London.

102,273. Flat rubber instep springs for gaiters. I. Rapaport, 50 Moor lane, London.

102,289. Reservoir pens. R. F. George and W. H. Gordon, 300 Boston Block, Seattle, Washington, U. S. A.

102,296. Rubber covered protective band for insertion between tire-tube and cover. P. Markoff, Antipiewski Pereulok House No. 10 qu. 19 Wolchonka, Moscow, Russia.

[ABSTRACTED IN THE ILLUSTRATED OFFICIAL JOURNAL, January 31, 1917.]

14,279 (1915). Rubber hot water bottle. T. Rowe, 52 Harold road, Leytonstone, Essex.

14,294 (1915). Life-saving vest. Montagu, Stern & Co. and S. Goldreich, Basildon House, Moorgate street, London.

14,308 (1915). Rubber tip for spouts of teapots, etc. T. W. Bennett, Victoria Pottery, Liverpool Road, Burslem, Staffordshire.

14,361 (1915). Pneumatic tires. W. H. Burritt, 4014 Lindell boulevard, St. Louis, Missouri, U. S. A.

14,362 (1915). Sheet rubber for use in the manufacture of rubber threads. S. Carnap, von, 79 Balthasarstrasse, Cologne, Germany.

14,382 (1915). Rubber buffers in electric signalling apparatus. M. A. Codd, 64 Belvedere road, Lambeth, London.

14,398 (1915). Ventilating means particularly applicable to rubber boots. E. M. DeL. Carolin, 17 Moorville Grove, Beeston Hill, Leeds.

14,433 (1915). Medical syringes. G. Raines, 34 Spencer street, London.

102,347. Protective band for insertion between tire tube and cover. A. E. Sopher, 53 West Side, Clapham Common, and P. R. S. Vincent, 27 Creffield road, Ealing—both in London.

102,379. Non-skid device for use with twin tires. J. A. Hill, Ordnance Works, Sheffield, assignee of V. Florio, 2 Via Catanio, Palermo, Italy.

102,429. Rebuilt tires. W. C. Taylor and F. Creassey, City Rubber Co., Upper Parliament street, Nottingham.

102,422. Detachable rubber tread band. G. Ishihara, 738 St. Helen's avenue, Tacoma, Washington, U. S. A.

102,446. Detachable rim. J. Stungo, 39 Cartvale road, Langside, Glasgow.

NEW ZEALAND.

38,800. Hot-water bottle or ice bag with means for compress or other attachment. T. W. Cotton, 153 Featherston street, Wellington, assignee of J. W. Appleton, New York City, U. S. A.

THE FRENCH REPUBLIC.

PATENTS ISSUED (WITH DATES OF APPLICATION).

481,199 (March 16, 1916). Plain tires. Société Française des Roues Amovibles.

481,217 (March 18, 1916). Improvements in process of re-covering old automobile tires. G. D. McGiehan.

481,219 (March 18, 1916). Protection of pneumatic tires. P. Markoff.

481,246 (March 21, 1916). Improvements in vulcanized rubber articles, and their process of manufacture. Goodyear's Metallic Rubber Shoe Co.

481,306 (March 25, 1916). Improvements in elastic wheels. M. Chupka.

481,293 (July 20, 1915). Process for the complete reclaiming of rubber from used automobile tires. H. Debauge.

481,335 (March 28, 1916). System and manufacture of pneumatic tires. A. H. Harris.

481,346 (March 30, 1916). Process for the production of plastic matter, possessing the quality of celluloid, ebonite and and gutta percha. J. Ostromyslenski.

481,350 (March 29, 1916). Pneumatic wheels. R. de Prandieres.

481,374 (April 3, 1916). Cover for pneumatics. F. Lehmann.

481,376 (April 3, 1916). Improvements applicable to rubber heels. F. Castelli and A. Guidi.

THE DOMINION OF CANADA.

ISSUED OCTOBER 31, 1916.

172,194. Rubber block wheel with pneumatic tire. C. A. James, Rose Park, South Australia, Australia.

172,317. Tire remover. J. G. Faria, Grafton, Calif.

172,337. Cushion tire. S. Johnstone, Corunna, Ontario.

172,369. Tire tool. M. Waters, New Albany, Ind.

172,396. Hose clamp. The Canadian Westinghouse Co., Limited, Hamilton, Ontario, assignee of C. A. McKerahan, Wilmerding, Pa.

172,537. Life preserving jacket. S. Sarosiek, Nutley, N. J.

172,568. An article made of vulcanized rubber having the structural characteristics of partially broken down rubber. The Canadian Consolidated Rubber Co., Limited, Montreal, Quebec, assignee of C. D. Mason, Naugatuck, Conn.

172,584. Lever for fountain pens. The L. E. Waterman Co., Limited, Montreal, Quebec, assignee of E. F. Britten, Jr., Jersey City, N. J.

172,628. Tire protector. J. R. Cahanne, Seattle, Wash.

172,644. Tire protector. W. H. Gahan, Victoria, B. C.

172,668. Armored tire. W. F. Macklin, Appleton, Wis.

172,670. Tire armor. W. McNames, Aberdeen, S. D.

172,681. Anti-skid chain. T. B. Noden, Moline, Ill.

172,684. Anti-skidding device. A. Purdie, Wyandotte, Mich.

172,776. Fabric for tires. The Canadian Consolidated Rubber Co., Limited, Montreal, Quebec, assignee of H. Z. Cobb, Winchester, Mass.

172,917. Overlay for half-tone printing formed integrally of rubber. J. B. Neale, and F. W. Gage, assignee of a half interest—both of Battle Creek, Mich.

172,918. Overlay for half-tone printing having a cushioning surface of rubber. J. B. Neale, and F. W. Gage, assignee of a half interest—both of Battle Creek, Mich.

DESIGNS.

THE UNITED STATES.

50,322. Bathing cap. Term 3½ years. Patented February 13, 1917. H. F. Samstag, New York City.

50,323. Bathing cap. Term 3½ years. Patented February 13, 1917. H. F. Samstag, New York City.

DESIGNS FOR TIRES.

THE UNITED STATES.

50,265. Tire tread. Term 7 years. Patented February 6, 1917. A. L. Breitenstein, Akron, assignor to The Lancaster Tire & Rubber Co., Lancaster—both in Ohio.

50,265

50,269

50,282

50,269. Automobile tire. Term 14 years. Patented February 6, 1917. P. De Mattia and B. De Mattia, Clifton, N. J.

50,282. Tire casing. Term 7 years. Patented February 6, 1917. G. W. Odell, South Bend, Ind.

TRADE-MARKS.

THE UNITED STATES.

95,422. The word SILVAREIGN—waterproof fabrics used in the manufacture of waterproofed garments. C. Kenyon & Co., Brooklyn, N. Y.

95,787. A design comprising the monogram M. A. M. Co., and the word MARVEL—tire vulcanizers and tire vulcanizing patches. The Marvel Accessories Manufacturing Co., Cleveland, Ohio.

98,122. An illustration of a horse shoe and on either side of it a wing—inner tubes for tires, tires, and tire casings composed in whole or in part of rubber or its equivalent or of rubber or its equivalent and fabric. Racine Auto Tire Co., Racine, Wis.

98,769. The word AD-ON-A-TREAD—double tread tire repair patches and repair boots. The Miller Rubber Co., Akron, Ohio.

99,199. The words SIN PAR—rubber and rubber-lined fabric hose. Peerless Rubber Manufacturing Co., New York City.

97,604. The word VELVETREAD—rubber and fabric casings or shoes for pneumatic tires. The Standard Tire & Rubber Manufacturing Co., Cleveland, Ohio.

98,855. The words MALTESE CROSS and a representation of a Maltese cross—automobile and bicycle tires of rubber and fabric. Ajax Rubber Co., Inc., Millbrook, N. Y.

85,548. The word ROADGRIP—rubber vehicle tires. The Portage Rubber Co., Barberton, Ohio.

99,213. The words WEE-NEE SQUAWKER—toy balloons. The Miller Rubber Co., Akron, Ohio.

99,701. The words THE TIRE RATE BOOK—a periodical issued three times yearly. The Class Journal Co., New York City.

99,702. The words TIRE RATE BOOK STANDARD TELEGRAPHIC CODE—a section of a periodical which is issued three times yearly. The Class Journal Co., New York City.

100,104. The word TUTEXKOTE—overcoats. United States Rubber Co., New York City.

100,106. The word BUSTERKOTE— *Same.*
100,107. The word KARTERKOTE— *Same.*
100,111. The word KASTERKOTE— *Same.*
100,112. The word KLEVERKOTE— *Same.*
100,113. The word KRAFTKOTE— *Same.*
100,118. The word KASTLEKOTE— *Same.*
100,119. The word KARLTONKOTE— *Same.*
100,121. The word KALDWELLKOTE— *Same.*
100,122. The word KIPPERKOTE— *Same.*
100,127. The word RIPPLEKOTE— *Same.*
100,131. The word KLUBBYKOTE— *Same.*
100,134. The word KARBLEYKOTE— *Same.*

95,395. The words SILVER KING—golf balls. The India-Rubber Gutta Percha & Telegraph Works Co., Limited, London, England.

97,616. The word PERMA-LOC—non-adhesive patches for the inner tubes of automobile tires. E. A. Conroy, Wilkes-Barre, Pa., assignor to Permaloc Manufacturing Co.

97,834. The word FLEXITE—flexible rubber and composition disks for use as a universal joint member. F. R. Blair & Co., Inc., New York City.

98,711. A representation of an automobile wheel, with the word EVERLOC thereon—non-adhesive patches for repairing inner tubes and tire casings and other rubber goods. W. C. Wood, Minneapolis, Minn.

99,790. The word GRYPHON—rubber tires. Gryphon Rubber & Tire Corporation, New York City.

99,854. The word MALCO—rubber pneumatic automobile tires. P. S. Malickson, Philadelphia, Pa.

THE UNITED KINGDOM.

375,960. The word NETTLE—rubber insulated electric cables. Callenders Cable & Construction Co., Limited, Hamilton House, Victoria Embankment, London, E. C.

373,888. The words REVOLITE DRI-SOLE—soles and heels of artificial leather. The Revolite Co., Limited, Cambridge Street Rubber Mills, Cambridge street, Bradford Road, Manchester.

373,195. Representation of a rope slip-knot—rubber heels for boots and shoes. Plymouth Rubber Co., Canton, Mass.

376,073. Representation of a man—rubber goods. The North British Rubber Co., Limited, Castle Mills, Fountainbridge, Edinburgh, Scotland.

NEW ZEALAND.

13,473. An illustration of a black cat—rubber heels. Foster Rubber Co., Boston, Massachusetts, U. S. A.

13,523. The words GOLD BOND—inflatable rubber tubes for use with rubber tires. The Fisk Rubber Co. of New York, Chicopee Falls, Massachusetts, U. S. A.

13,525. An illustration of a child dressed in sleeping garments, holding a tire in one hand, in the other a lighted candle, underneath is written the words TIME TO RE-TIRE? and (BUY FISK)—goods manufactured from rubber and gutta percha not included in other classes. The Fisk Rubber Co. of New York, Chicopee Falls, Massachusetts, U. S. A.

THE DOMINION OF CANADA.

22,041. The word WELDACUT—a composition made either wholly or partly of rubber or in which rubber is a component part, such composition to be used for the sealing of small cuts in tires, tubes and other rubber goods. Gutta Percha & Rubber, Limited, Toronto, Ontario.

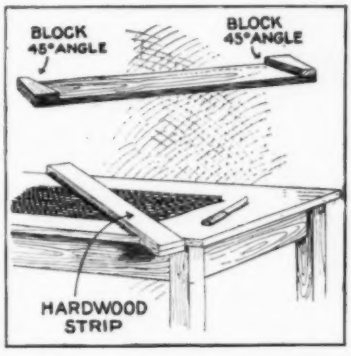
22,065. The word PIONEER—suspenders, garters, belts and armbands. Pioneer Suspender Co., Philadelphia, Pa.

22,072. The word TIREOID—composition for sealing punctures in pneumatic tires. The Tireoid Co., Chicago, Ill.

22,082. The word TENAX—substance composed wholly or partly of rubber or in which rubber or rubber substitutes are component parts, such substance to be used principally for soles and heels in connection with both leather and rubber footwear of all kinds, and as a substitute for leather soles and heels. Gutta Percha & Rubber Co., Limited, Toronto, Ontario.

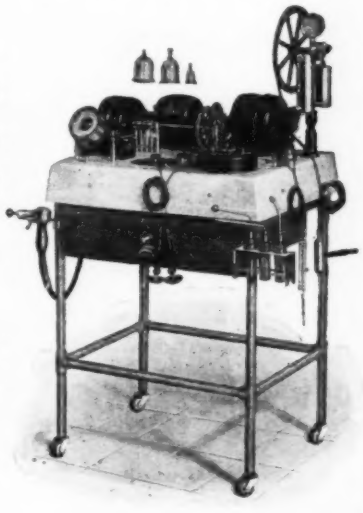
A HOME-MADE BIAS CUTTER.

In the Goodyear Tire & Rubber Co.'s repair school at Akron, Ohio, cutting fabric on the bias is done with a wet knife instead of with shears. A straight edge like the one shown in the illustration, with blocks that have 45-degree edges nailed to either end, is used. These edges even up against the edge of the table and secure a perfect 45-degree cutting angle. The device is simple, but very effective. The hardwood strip which forms the straight edge for cutting can be made in a few minutes by any repairman.



McINTOSH UNIVERSAL MODE.

As the name indicates, this apparatus can perform various functions. It is designed to take the place of separate electrical equipment for the many tasks performed by motors in a physician's work, such as running an air compressor, driving a generator to produce galvanic current, generating a sinusoidal current, delivering cautery current, operating vibrators, etc. By turning the knob of a cleverly devised dial selector, the particular form of current desired is instantly placed in service.



The rubber-tired wheel shown in the illustration is keyed to the rotor shaft and by turning a crank at the end of the rotor shaft which controls a threaded rod engaging this wheel, its position against the friction cone adjusts the frequency of the sinusoidal and other slowly pulsating waves. When the sinusoidal current is not desired, useless wear on these frictional contacts can be eliminated by means of an adjustable hub on the motor shaft which throws the friction gear out of service.

This all-in-one apparatus provides a simple, complete and durable outfit for the medical practitioner and it is claimed to be the most economical apparatus for the purposes it fulfills. [McIntosh Battery & Optical Co., Chicago, Illinois.]

B. H. V. Barnard, deputy Conservator of Forests, at Perak, Federated Malay States, has contributed a very comprehensive article on gutta percha in the November, 1916, number of the Agricultural Bulletin. Another article on coagulation of latex in the presence of sugars tells of the investigations of Doctors Gurter and Swart of the West Java Testing Station.

Review of the Crude Rubber Market.

NEW YORK.

EARLY in February the unfavorable shipping situation that prevailed was followed by the announcement of Germany's submarine blockade, causing grave uncertainty in the crude rubber market. Spot stocks were undoubtedly low and the possible loss of rubber cargoes destined to America constituted a formidable threat. Consequently when the diplomatic break with Germany was reported, the market became very erratic and prices fluctuated violently. On February 5, First latex and Ribbed smoked sheet, spot, ranged from 86 to 88 cents, and April-June positions for both grades were quoted from 81 to 83 cents. Amber crêpe, light, was 85 to 88 cents and Roll brown, spot, was 68 to 72 cents. Paras were also affected by the upward movement, Upriver fine, spot, being quoted 82-84 cents; Upriver coarse, 53 to 56 cents; Caucho ball, 54-55 cents and Cameta, 38 to 40 cents.

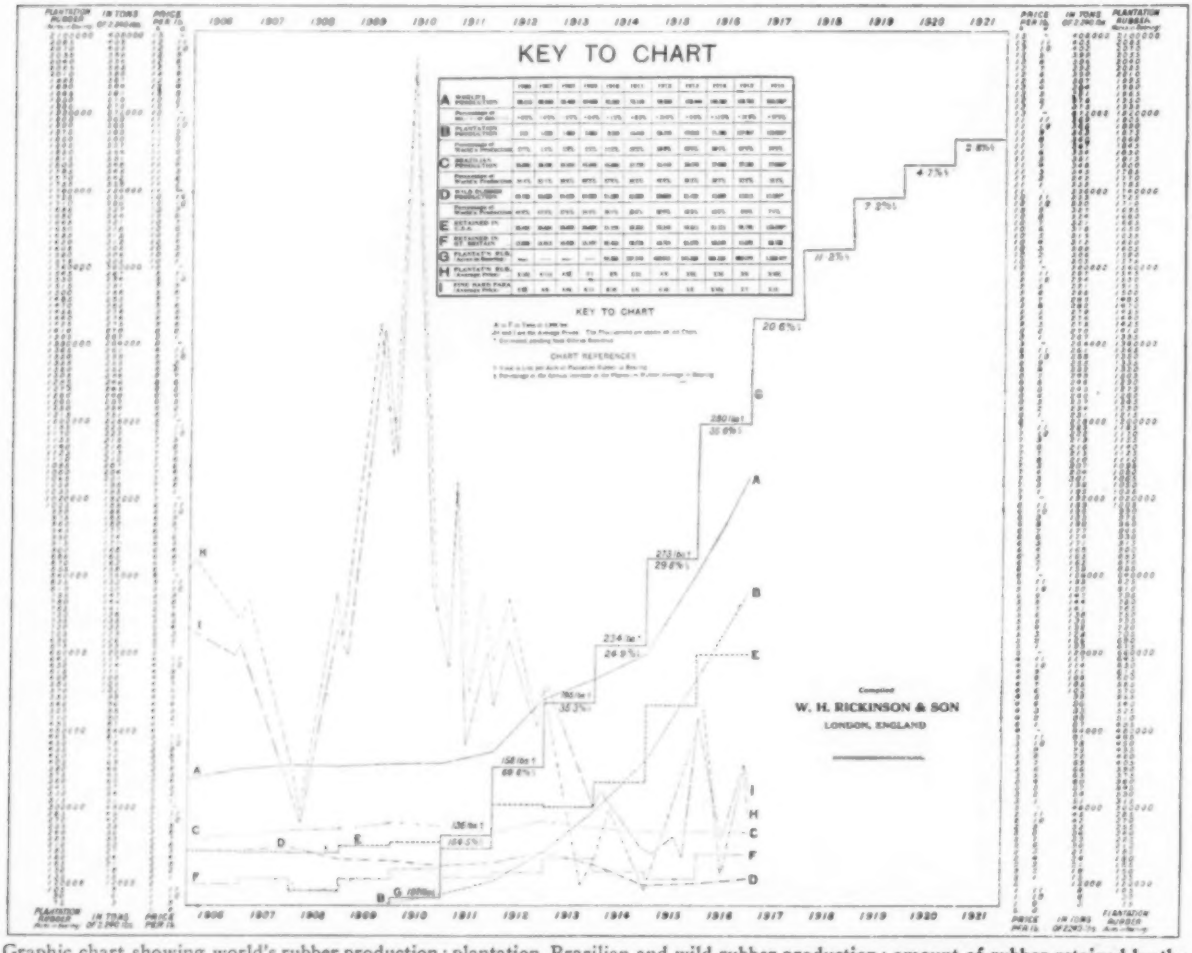
The market steadily advanced, supported by keen interest on the part of the manufacturers, who had evidently become apprehensive. The volume of dealers' business was noticeably large and general trading active. On February 15, First latex, spot, and Ribbed smoked sheet were 91½ cents, with April-June positions at 83½ cents. Paras were firm and in good demand, Upriver fine, spot,* being quoted 86 cents. Islands fine was very scarce.

As time passed with no overt act on the part of Germany, and rubber continued to arrive in considerable volume, the market became easier and prices gradually declined. On February 27 market conditions were very quiet and prices varied widely, First latex and Ribbed smoked sheets being quoted 84 to 86 cents and Upriver fine, 80 cents.

According to statistics compiled by the Rubber Association of America the United States imports for the year ending December 31, 1916, were 115,609 tons, divided as follows: Plantations, 85,531 tons; Paras, 22,060 tons; Africans, 3,591 tons; Centrals, 1,768 tons; Guayule, 1,140 tons; Manicoba and the other sorts, 1,519 tons.

LONDON.

Early in the month there was a noticeable tendency on the part of buyers to hold off, resulting in a generally quiet market tone. First latex and Ribbed smoked sheet, spot, were quoted 75 cents to buyers on February 5, with July-December positions at 72 cents. The anxiety on the part of American buyers to provide against submarine contingencies created an active market and prices advanced. On February 15 the First latex and Ribbed



Graphic chart showing world's rubber production; plantation, Brazilian and wild rubber production; amount of rubber retained by the United States and Great Britain; acreage of plantation rubber in bearing; average prices of plantation and Pará rubber; yield in pounds per acre and percentage of annual increase of plantation rubber acreage in bearing.

smoked sheet spot price to buyers was 80 cents. Trading continued briskly until the American apprehension had subsided, when easier conditions prevailed and prices declined. On February 26, First latex and Ribbed smoked sheet were quoted 77½ cents.

SINGAPORE.

For the period from December 29, 1916, to January 4, 1917, inclusive, the value of the highest grade of rubber is fixed at 74 cents per pound, and the 2½ per cent ad valorem duty on cultivated rubber will be assessed on a price of 68 cents per pound for all grades.

The average prices obtained at the auctions held February 12, 17 and 22, are as follows: First latex crêpe, 66.1 cents; Ribbed smoked sheet, 65.6 cents. The total amount sold was 1,356 tons.

BATAVIA.

The exports of plantation rubber from the Dutch East Indies for 1915 were 20,100 tons. For the first six months of 1916 the exports were 15,121 tons, forecasting a total of 30,000 tons for 1916.

NEW YORK QUOTATIONS.

Following are the quotations at New York one year ago, one month ago and the current date:

PARA.	Mar. 1, '16.	Feb. 1, '17.	Feb. 27, '17.
Upriver, fine, new	77 @78	77 @	79 @
Islands, fine, new	70 @71	72 @	Nominal
Upriver, coarse, new	59 @60	50 @	53½@
Islands, coarse, new	37 @38	31 @	35 @
Cametá	40 @41	32 @	38 @
Caucho, ball, upper	61 @62	51 @	55 @
Caucho, ball, lower	58 @59	49 @	51 @52
PLANTATION.			
First latex crêpe	93 @94	Spot 75 @75½; Apr.-June 72 @	85 @
Amber crêpe, light	90 @	Spot 71 @72; Futures	83 @
Brown crêpe, clean	85 @	Spot 70 @71; Futures	81 @
Smoked sheet, ribbed	92 @93	Spot 75 @75½; Apr.-June 72 @	85 @
Fine sheets and biscuits, unsmoked	91 @	.....	.....
CENTRALS.			
Corinto	57 @59	49 @	52 @
Esmeralda, sausage	57 @59	47 @48	51 @
Nicaragua, scrap	56 @57	47 @	49 @
Mexican plantation, sheet	60 @	54 @56	.....
Mexican, scrap	53 @	46 @	51 @52
Mexican, slab	38 @40	31 @	35 @
Manicoba	50 @52½	42 @	32 @
Mangabeira, sheet	42 @45	40 @	32 @
Guayule	48 @	42 @44	56 @
Balata, sheet	66 @67	78 @78½	78 @
Balata, block	45 @46	64 @64½	65 @
AFRICAN.			
Lopori, ball, prime	.....	.....	65 @
Lopori, strip, prime	59 @	.....	65 @
Upper Congo, ball, red	62 @	.....	57 @
Rio Nunez Niggers	72 @73	62 @63	68 @
Conakry Niggers	74 @75	60 @62	66 @
Massai, red	74 @75	60 @	65 @
Soudan, Niggers	.....	.....	65 @
Cameroon, ball, soft	46 @	.....	47 @
Cameroon, ball, hard	50 @	.....	.....
Benguela, No. 2, Superior	46 @48	44 @	47 @
Benguela, No. 2	.....	41 @	44 @
Accra, flake	38 @40	30 @	32 @
EAST INDIAN.			
Assam	58 @	50 @	78 @
Pontianak	10 @10½	9¼@	8¼@
Gutta Siak	15 @16½	.....	.....
Gutta red Niger	.....	22 @	23 @24
Borneo III	27½@	.....	.....
Gutta Percha, red Macassa	1.50@2.00	1.90@	1.90@3.50

COMPARATIVE NEW YORK PRICES FOR FEBRUARY.

In regard to the financial situation, Albert B. Beers (broker in crude rubber and commercial paper, No. 68 William street, New York) advises as follows:

"The demand for commercial paper during February has been fairly good on the whole, the best rubber names moving at 4½@5 per cent, and those not so well known 5½@6 per cent, but during the early part of the month when the flurry was in the money market there was but little demand."

	1917.*	1916.	1915.
Upriver, fine ..... *cents*	75@87	73@80	57@61
Upriver, coarse	50@57	52@60	44@48
Islands, fine	67@80	67@74	50@54
Islands, coarse	31@36	35@38	28@32
Cametá	34@40	37@40	30@36

*Figured only to February 24.

MARKET CABLE SERVICE FROM SINGAPORE.

The following reports of the weekly auctions held at Singapore have been cabled by The Waterhouse Co., Limited:

Date.	Crêpe. Price per lb.	Smoked Sheet. Price per lb.	Tons Sold.	Market.
February 12...*cents*	65.87	65.45	603	Large business and prices strong.
February 17.....	65.87	65.45	281	There is a fair demand for better grades.
February 23.....	66.72	65.87	472	Good demand for all descriptions.

MARKET CABLE SERVICE FROM LONDON.

The following market report has been cabled from Aldens' Successors, Limited, London:

Date.	Standard Crêpe.	Ribbed Smoked Sheet.	Market.
February 5.....*cents*	74.24	74.24	There were buyers.
February 13	78.69	78.69	There were buyers.
February 19	78.69	78.69	There were buyers.

WEEKLY RUBBER REPORT.

GUTHRIE & CO., LIMITED, Singapore, report [December 29, 1916]:

At the weekly auction held yesterday and today bidding was again stiff and all grades, except fine pale crêpe, suffered a decline averaging about $4 per picul. At $146 the top price for fine pale crêpe was $4 up, but this figure was exceptional, the average being $140 per picul. The highest paid for ribbed smoked sheet was $137, being a drop of $5 on the week. For unsmoked sheet there was no demand. The lower grades met with a better demand than last week at the lower level. The quantity sold was 393 tons, out of a total of 1,129 tons offered.

The following was the course of values:

	In Singapore per picul.*	Sterling equivalent per pound in London.	Equivalent per pound in cents.
Sheet, fine ribbed smoked	$130@137	2/ 6¼@2/ 8¼	55.25@58.22
Sheet, good ribbed smoked	125@130	2/ 5¼@2/ 6¼	53.12@55.25
Sheet, plain smoked	115@123	2/ 3¼@2/ 5⅛	48.87@52.27
Sheet, ribbed unsmoked	...@...	.....@.....	.....@.....
Sheet, plain unsmoked	...@...	.....@.....	.....@.....
Crêpe, fine pale	136@146	2/ 8 @2/10½	57.80@62.05
Crêpe, good pale	125@134	2/ 5¼@2/ 7⅛	53.12@56.95
Crêpe, fine brown	115@120	2/ 3⅝@2/ 4¼	48.87@51.00
Crêpe, good brown	109@115	2/ 2⅛@2/ 3⅝	46.32@48.87
Crêpe, dark	85@110	1/ 9⅛@2/ 2⅛	36.12@46.75
Crêpe, bark	60@101	1/ 4⅛@2/ 0¼	25.50@42.92
Scrap, virgin	86@	1/ 9½@	36.55@
Scrap, pressed	84@	1/ 9⅛@	35.70@
Scrap, loose	82@	1/ 8¼@	34.85@

*Picul = 133⅓ pounds.
Quoted in S. S. dollars = 2/4 [56.7 cents].

PLANTATION RUBBER FROM THE FAR EAST.

TOTAL EXPORTS FROM MALAYA.

(From January 1, 1916, to dates named, excluding all foreign transhipments. Reported by Barlow & Co., Singapore.)

	From				
To—	Singapore. October 31, 1916.	Malacca. October 31, 1916.	Penang. October 31, 1916.	Port Swettenham. December 26, 1916.	Totals.
United Kingdom..*lbs.*	26,854,241	6,376,557	21,416,167	28,007,373	82,654,338
The Continent	9,366,270	.....	55,733	.....	9,422,003
Japan	3,508,344	.....	.....	.....	3,508,344
Ceylon	604,283	.....	563,600	1,615,073	2,782,956
United States	69,509,518	.....	9,105,067	1,716,875	80,331,460
Australia	268,302	.....	.....	.....	268,302
Totals	110,110,958	6,376,557	31,140,567	31,339,321	179,020,523
Same period, 1915	66,782,158	6,617,032	24,322,531	31,286,389	128,708,110
Same period, 1914	32,919,222	4,108,376	20,009,367	28,877,774	85,914,739
Same period, 1913	21,830,702	.....	12,925,467	20,254,269	55,010,438

FEDERATED MALAY STATES RUBBER EXPORTS.

It is reported by official cablegram from Kuala Lumpur that the export of plantation rubber from the Federated Malay States in the month of January amounted to 5,995 tons, compared with 5,717 tons in December last and 4,471 tons in the corresponding month last year.

EXPORTS OF CEYLON GROWN RUBBER.

(From January 1 to December 18, 1915 and 1916. Compiled by the Ceylon Chamber of Commerce.)

To—	1915.	1916.
United States ..... *pounds*	18,193,395	25,667,293
Canada and Newfoundland	392,495	6,720
France	593,532	1,769,327
Russia	332,200	293,674
Italy	.....	164,640
United Kingdom	23,161,446	21,903,181
Australia	844,977	783,651
India	1,530	1,408
Straits Settlements	119,933	43,680
Japan	262,661	335,689
Totals	43,902,169	50,969,263

(Same period 1914, 34,888,617 pounds; same period 1913, 25,482,799.) The export figures of rubber, given in the above table for 1914, include the imports reëxported. (These amount to 2,844,398 pounds from the Straits Settlements and 819,574 pounds from India.) To arrive at the total quantity of Ceylon rubber exported for that year deduct these imports from the total exports. The figures for 1915 and 1916 are for Ceylon rubber only.

IMPORTS AND EXPORTS OF RAW RUBBER AT CEYLON.

IMPORTS.

FROM NOV. 28 TO DEC. 31, 1916.

From—	POUNDS.
Malay Peninsula—	
Port Swettenham	166,371
Penang	69,696
Port Dickson	60,125
Singapore	31,065
Total	327,257
India—	
Tuticorin	181,627
Cochin	106,920
Alleppy	29,180
Calcutta	572
Total	318,299
Burma—	
Rangoon	37,524
Grand Total	683,080

EXPORTS.

FROM DECEMBER 1-31, 1916.

To—	POUNDS.
North America:	
United States—	
New York	929,481
Seattle	69,456
Boston	8,960
Total	1,007,897
Europe:	
United Kingdom—	
England—	
London	999,613
Liverpool	29,830
Manchester	1,819
Total	1,131,262
Asia:	
Japan—	
Yokohama	8,960
Kobe	3,911
India (Bombay)	383
Total	13,254
Oceania:	
Australia	13,440
Grand Total	1,157,956

STRAITS SETTLEMENTS RUBBER EXPORTS.

An official cablegram from Singapore gives the export of plantation rubber from Straits Settlements ports for the month of December last as 3,219 tons, including transhipments amounting to 768 tons. The figures for November were 5,247 tons and for December, 1915, 3,005 tons. The total export for the past year was 48,650 tons, compared with 34,891 tons in 1915 and 19,727 tons in 1914. The following are the comparative figures:

	1914.	1915.	1916.
January ..... *tons*	1,181	2,576	4,443
February	1,703	2,741	3,359
March	1,285	2,477	4,481
April	1,548	1,978	4,219
May	1,309	3,588	3,274
June	1,480	2,249	3,836
July	1,584	2,324	5,106
August	1,325	2,295	3,246
September	1,602	4,725	2,987
October	2,006	2,641	5,233
November	2,370	4,292	5,247
December	2,334	3,005	3,219
Totals	19,727	34,891	48,650

These figures include transhipments of rubber from various places in the neighborhood of the Straits Settlements, such as Borneo, Java, Sumatra and the non-Federated Malay States as well as rubber actually exported from the Colony, but do not include rubber exports from the Federated Malay States.

IMPORTS AND EXPORTS OF RUBBER AND GUTTA AT SINGAPORE.

IMPORTS.

December, 1916.

From—	Para Rubber.	Para Rubber for Treatment.	Borneo Rubber.	Gutta Percha.	Gutta Jelutong.
Malay Peninsula—					
Port Swettenham. *pounds*	2,410,266	.....	.....	.....	.....
Teluk Anson	1,341,733	.....	.....	.....	.....
Muar	1,068,266	.....	.....	.....	.....
Penang	717,200	164,400	.....	.....	.....
Malacca	674,133	612,000	.....	.....	.....
Port Dickson	171,866	318,400	.....	.....	.....
Kelantan	134,400	.....	.....	.....	.....
Kuantan	52,800	.....	.....	133	.....
Rengat	20,666	26,666	.....	.....	.....
Mersing	4,933	.....	.....	.....	.....
Pahang	1,600	.....	.....	.....	.....
S. Pandjang	1,466	.....	.....	.....	.....
Tringganu	266	.....	.....	.....	.....
Totals	6,599,595	1,121,466	.....	133	.....

December, 1916.

From—	Para Rubber.	Para Rubber for Treatment.	Borneo Rubber.	Gutta Percha.	Gutta Jelutong.
Borneo—					
Sarawak	135,600	27,333	533	11,600	763,200
Bandjermassin	99,733	38,466	2,666	66,766	258,400
Pontianak	67,466	.....	933	2,800	70,666
Sibu	66,133	.....	1,733	16,800	189,200
Labuan	52,933	.....	.....	3,600	209,333
Jesselton	40,533	395,600	.....	400	.....
Sambas	29,200	.....	.....	.....	4,666
Sandakan	26,266	48,811	.....	.....	.....
Kudat	17,200	47,066	133	133	.....
Passir	13,066	.....	.....	.....	.....
Singkawang	9,600	.....	.....	.....	.....
Sampit	2,666	.....	1,333	533	269,866
Samarinda	800	.....	666	6,666	.....
Kunnig	800	.....	.....	.....	.....
Totals	561,996	557,276	7,997	109,298	1,765,331
Sumatra—					
Djambi	206,000	.....	.....	.....	.....
Deli	93,066	508,533	.....	.....	.....
Palembang	40,533	.....	1,866	.....	203,066
Siak	5,333	.....	.....	1,600	.....
Muntok	4,400	.....	.....	.....	.....
Bengkalis	2,400	.....	.....	.....	.....
Indragin	266	.....	.....	.....	59,063
Belawan	.....	217,466	.....	.....	.....
P. Bon	133	.....	800	.....	40,000
Asahan	.....	64,666	.....	.....	.....
Totals	352,131	790,665	2,666	1,600	302,129
Java—					
Sourabaya	215,333	.....	.....	.....	.....
Batavia	77,466	.....	.....	.....	.....
Samarang	1,333	.....	.....	666	.....
Totals	294,132	.....	.....	666	.....
Siam—					
Bangkok	266	.....	.....	2,933	.....
Patani	133	.....	.....	.....	.....
Total	.....	.....	.....	2,933	.....
Burma—					
Rangoon	13,600	.....	.....	.....	.....
Mergui	4,666	.....	.....	.....	.....
Total	18,266	.....	.....	.....	.....
Other ports	202,633	163,166	5,333	4,533	85,733
Grand Totals	8,029,152	2,632,573	15,996	119,163	2,153,193

EXPORTS.

December, 1916.

To—	Para Rubber.	Para Rubber Transhipped.	Borneo Rubber.	Gutta Percha.	Gutta Jelutong.
NORTH AMERICA:					
United States—					
Akron	2,496,266	26,800	.....	.....	.....
New York	1,948,266	197,333	.....	56,133	148,800
Seattle	500,533	23,733	.....	.....	.....
Boston	11,200	.....	.....	.....	127,133
Canada—					
Ontario (Toronto)	92,133	.....	.....	.....	.....
Totals	5,048,398	247,866	.....	56,133	275,933
EUROPE:					
United Kingdom—					
England—					
London	651,200	2,172,133	.....	136,666	116,933
Liverpool	105,333	177,333	.....	.....	19,733
Russia (Vladivostok)	1,673,066	.....	.....	.....	.....
France (Marseilles)	89,200	.....	.....	.....	.....
Italy (Genoa)	24,400	.....	.....	.....	.....
Totals	2,543,199	2,349,466	.....	136,666	136,666
Grand Totals	7,592,597	2,597,332	.....	192,799	412,599

CRUDE RUBBER ARRIVALS AT THE PORT OF NEW YORK.

[*The Figures Indicate Weight in Pounds.*]

PARAS FROM BRAZIL.

JANUARY 29.—By the steamer *Tapajos* from Pará:

	Fine.	Coarse.	Medium.	Caucho.	Totals.
H. A. Astlett & Co.	.....	.....	.....	.....=	199,350
Aldens' Successors, Ltd.	800	.....	400	85,000=	86,200
G. Amsinck & Co.	.....	.....	.....	.....=	74,700
Meyer & Brown	.....	.....	.....	.....=	180,450
General Rubber Co.	.....	.....	.....	.....=	101,700
Arnold & Zeiss	.....	.....	.....	.....=	147,600
W. R. Grace & Co.	.....	.....	.....	.....=	6,750
Raw Products Co.	.....	.....	.....	.....=	11,250
Muller, Schall & Co.	.....	.....	.....	.....=	34,650
Neuss, Hesslein & Co.	.....	.....	.....	.....=	198,900
E. T. Greiner	.....	.....	.....	.....=	116,550
Various	.....	.....	.....	.....=	540,900
Total	.....	.....	.....	.....=	1,699,000

FEBRUARY 7.—By the steamer *Manitowoc* from Montevidio:

A. D. Straus & Co.	.....	.....	.....	.....=	2,700
Neuss, Hesslein & Co.	5,148	.....	.....	.....=	5,148
Total	.....	.....	.....	.....=	7,848

	Fine.	Coarse.	Medium.	Caucho.	Totals.
FEBRUARY 8.—By the steamer *Ancon* from Cristobal:					
Neuss, Hesslein & Co.	6,800	700	.....	.....=	7,500
FEBRUARY 10.—By the steamer *Zulia* from Curacao:					
G. Amsinck & Co.	.....	.....	.....	.....=	232,650
FEBRUARY 13.—By the steamer *Tennyson* from Buenos Aires:					
Various (London & Brazilian Bank)	.....	.....	.....	.....=	170,100
FEBRUARY 13.—By the steamer *Sergipe* from Rio de Janeiro:					
General Rubber Co.	56,000	22,200	6,400	.....=	84,600
W. R. Grace & Co.	.....	.....	.....	3,500=	3,500
Muller, Schall & Co.	91,200	15,000	71,040	4,000=	181,240
Arnold & Zeiss	640	32,400	3,840	5,000=	41,880
Konig Bros. & Co.	1,610	.....	.....	.....=	1,610
Baring Bros. & Co., Ltd.	52,480	.....	2,560	10,500=	65,540
Goldman, Sacks & Co.	.....	.....	.....	3,500=	3,500
Various	125,440	69,600	15,040	9,000=	219,080
Total	.....	.....	.....	.....=	600,950
FEBRUARY 13.—By the steamer *Maranhao* from Itacoatiara:					
Various	2,880	6,000	640	30,000=	39,520
FEBRUARY 13.—By the steamer *Brazil* from Manáos:					
Muller, Schall & Co.	.....	.....	.....	.....=	90,000

	Fine.	Coarse.	Medium.	Caucho.	Totals.
FEBRUARY 19.—By the steamer *Francis* from Manáos:					
Arnold & Zeiss	.....	.....	.....	.....=	86,850
Aldens' Successors, Ltd.	27,000	97,000	58,000	.....=	182,000
Various	.....	.....	.....	.....=	852,750
Total	.....	.....	.....	.....=	1,121,550
FEBRUARY 19.—By the steamer *Francis* from Pará:					
H. A. Astlett & Co.	.....	.....	.....	.....=	170,550
G. Amsinck & Co.	.....	.....	.....	.....=	318,600
Hagemeyer & Brunn	.....	.....	.....	.....=	8,100
Arnold & Zeiss	.....	.....	.....	.....=	256,950
Winter Sons & Co.	.....	.....	.....	.....=	49,500
Paul Bertuch	.....	.....	.....	.....=	221,400
Truhling & Goshen	.....	.....	.....	.....=	47,250
Goldman, Sacks & Co.	.....	.....	.....	.....=	162,450
Lazard Freres	.....	.....	.....	.....=	385,200
Various	.....	.....	.....	.....=	514,700
Total	.....	.....	.....	.....=	2,134,700
FEBRUARY 21.—By the *Rio de Janeiro from Pará**					
H. A. Astlett & Co.	.....	.....	.....	.....=	28,800
Arnold & Zeiss	.....	.....	.....	.....=	70,200
Muller, Schall & Co.	.....	.....	.....	.....=	292,950
Konig Bros. & Co.	.....	.....	.....	.....=	148,500
Thomas & Co.	.....	.....	.....	.....=	450
Various	.....	.....	.....	.....=	503,550
Total	.....	.....	.....	.....=	1,044,450

* In above cargo 659 boxes were short-shipped.

CENTRALS.

		Pounds.
JANUARY 29.—By the *Manzanillo*=Acajutla:		
Bloom Bros.		1,540
JANUARY 29.—By the *Manzanillo*=Corinto:		
American Trading Co.	1,600	
Various	1,500	3,100
JANUARY 29.—By the *Manzanillo*=San Juan Del Sur:		
G. Amsinck & Co.	5,800	
Gontard & Co.	1,600	7,400
JANUARY 29.—By the *Tivives*=Puerto Cortez:		
Broedermann & Litzrodt		1,100
JANUARY 29.—By the *Tivives*=Puerto Barrios:		
W. R. Grace & Co.	200	
A. Rosenthal & Sons	5,100	
J. S. Sembrada & Co.	2,800	8,100
JANUARY 30.—By the *Calamares*=Port Limon:		
A. A. Lindo & Co.		600
FEBRUARY 2.—By the *Carrillo*=Cartagena:		
G. Amsinck & Co.	14,700	
Blanco & Co.	200	14,900
FEBRUARY 2.—By the *Carrillo*=Puerto Colombia:		
G. Amsinck & Co.		300
FEBRUARY 2.—By the *Philadelphia*=Puerto Cabello:		
American Trading Co.		800
FEBRUARY 6.—By the *Tenadores*=Port Limon:		
I. Brandon Bros.		400
FEBRUARY 6.—By the *Esperanza*=Vera Cruz:		
H. Marquardt & Co.	3,300	
L. Johnson & Co.	3,960	
U. S. Brokerage Co.	440	7,700
FEBRUARY 7.—By the *Colon*=Panama City:		
Fidanque Bros. & Sons	1,430	
The Otto Gerdau Co.	10,340	
I. Brandon & Bros.	110	
Piza Nephews Co.	3,300	15,180
FEBRUARY 7.—By the *Colon*=Cristobal:		
G. Amsinck & Co.	9,240	
Muller, Schall & Co.	7,480	
Gontard & Co.	110	16,830
FEBRUARY 7.—By the *Maravel*=Paramaribo:		
Middleton & Co.	1,100	
R. Dan Walterbeck	220	1,320
FEBRUARY 8.—By the *Ancon*=Cristobal:		
G. Amsinck & Co.	9,570	
L. Johnson & Co.	10,890	
Dumarest Bros.	1,540	
Pablo Calvet & Co.	2,310	24,310
FEBRUARY 9.—By the *Santa Marta*=Cartagena:		
Andean Trading Co.	3,960	
G. Amsinck & Co.	6,600	
R. del Castillo & Cia.	330	
A. Held	550	
Cowdrey Co.	110	11,550
FEBRUARY 13.—By the *Metapan*=Port Limon:		
I. Brandon & Bros.	550	
C. F. Hernandez Sons & Co.	220	770
FEBRUARY 13.—By the *Siraola*=Puerto Cortez:		
G. Amsinck & Co.	440	
W. R. Grace & Co.	1,540	
J. S. Sembrada & Co.	2,310	
Eggers & Heinlein	110	
Various	220	4,620
FEBRUARY 15.—By the *Caracas*=Puerto Cabello:		
Scholtz & Co.		1,320
FEBRUARY 15.—By the *Advance*=Cristobal:		
G. Amsinck & Co.	22,220	
Gontard & Co.	9,020	
J. S. Sembrada	2,640	
Mecke & Co.	2,200	
Chas. E. Griffen	2,420	
Harburger & Stack	660	
A. M. Capen's Sons	7,480	46,640
FEBRUARY 16.—By the *Almirante*=Cartagena:		
G. Amsinck & Co.	7,920	
Muller, Schall & Co.	440	
R. del Castillo	1,980	
Pablo Calvet & Co.	1,980	12,320
FEBRUARY 18.—By the *Saramacca*=Puerto Colombia:		
Heilbron, Wolff & Co.		1,100
FEBRUARY 19.—By the *Pastores*=Puerto Limon:		
I. Brandon & Bros.	2,420	
A. A. Lindo & Co.	1,100	
Albert B. Beers	6,820	10,340
FEBRUARY 19.—By the *Monterey*=Vera Cruz:		
H. Marquardt	220	
Yglesias & Co.	440	
Graham, Henkler & Co.	220	
A. E. Paulson & Co.	5,940	
J. A. Medina & Co.	1,540	
Various	1,320	9,680
FEBRUARY 21.—By the *Panama*=Cristobal:		
Pablo Calvet & Co.	10,300	
T. Hecke & Co.	1,300	
Lawrence Turnure & Co.	4,500	
G. Amsinck & Co.	2,000	
Fidanque Bros. & Sons	700	
Pottberg, Ebling & Co.	100	18,900
FEBRUARY 23.—By the *Zacapa*=Cartagena:		
American Trading Co.	1,900	
G. Amsinck & Co.	4,500	
Rafael del Castillo & Co.	900	7,300
FEBRUARY 23.—By the *Jalisco*=La Libertad:		
South & Central American Co.		800
FEBRUARY 23.—By the *Jalisco*=Amapala:		
R. G. Barthold & Co.	1,600	
Eggers & Heinlein	1,000	1,600
FEBRUARY 23.—By the *Jalisco*=Corinte:		
American Trading Co.	900	
G. Amsinck & Co.	3,600	
Meyer & Hecht	900	
Various	4,200	9,600

AFRICANS.

		Pounds.
JANUARY 31.—By the *Basse Terre*=Bordeaux:		
Wm. H. Stiles	22,000	
Various	3,375	25,375
FEBRUARY 1.—By the *Galileo*=Hull:		
Robinson & Co.	43,625	
Meyer & Brown	91,375	
Hagemeyer Trading Co.	22,688	157,688
FEBRUARY 5.—By the *Regina d'Italia*=Genoa:		
T. D. Downing & Co.		4,375
FEBRUARY 13.—By the *Chorley*=Bordeaux:		
Various		145,750
FEBRUARY 13.—By the *Roma*=Lisbon:		
Various.		309,125
FEBRUARY 13.—By the *Feltria*=London:		
Aldens' Successors, Ltd.		4,000
FEBRUARY 15.—By the *Bassano*=Hull:		
The Hagemeyer Trading Co.		22,591
FEBRUARY 17.—By the *Buffalo*=London:		
Aldens' Successors, Ltd.		56,000
FEBRUARY 15.—By the *Bassano*=Hull:		
Robert Badenhop Co.		48,725
FEBRUARY 16.—By the *Virginia*=Naples:		
Wm. H. Stiles	30,250	
L. Littlejohn & Co.	6,875	
Meyer & Brown	95,500	
Edward Maurer & Co., Inc.	9,875	
Robert Badenhop	10,500	
Rumsey, Grintert & Co.	32,625	
J. H. Rossbach & Bros.	1,595	187,210
FEBRUARY 17.—By the *Honduras*=Havre:		
Gaw, Keshishsan & Co.		375
FEBRUARY 19.—By the *Lincolnshire*=Bordeaux:		
Joseph Chalfin	54,000	
Various	112,000	166,000

MANICOBAS.

		Pounds.
JANUARY 30.—By the *Bayamo*=Bahia:		
G. Amsinck & Co.		19,800
JANUARY 30.—By the *Raphael*=Buenos Aires:		
Various		104,280
FEBRUARY 19.—By the *Francis*=Pernambuco:		
Various		21,120
FEBRUARY 19.—By the *Francis*=Ceara:		
Various		13,860

PLANTATIONS.

		Pounds.
JANUARY 30.—By the *Carmania*=Liverpool:		
United States Rubber Co.	16,200	
G. Amsinck & Co.	3,780	
Various	37,665	57,645
JANUARY 31.—By the *City of Rangoon*=Colombo:		
Wm. H. Stiles	15,000	
Hagemeyer Trading Co.	25,890	
Arnold & Zeiss	3,240	
Fred. Sterns & Co.	25,380	
Various	288,375	357,885
FEBRUARY 6.—By the *City of Lahore*=Colombo:		
Aldens' Successors, Ltd.	11,200	
Hagemeyer Trading Co.	6,720	
Fred. Stern & Co.	13,400	
W. H. Stiles & Co.	75,000	
Various	235,460	341,820
FEBRUARY 6.—By the *Pleiades*=Singapore:		
Goodyear Tire & Rubber Co.	4,050	
Rubber Trading Co.	4,860	
Henderson & Korn	16,605	
Charles T. Wilson Co., Inc.	47,385	
Fred. Stern & Co.	43,875	
W. R. Grace & Co.	31,590	
Arnold & Zeiss	7,020	
Robinson & Co.	105,705	
L. Littlejohn & Co.	55,890	
Arthur Meyer	4,320	
W. H. Stiles & Co.	44,800	366,100

		POUNDS.
FEBRUARY 9.—By the *Metaba*=London:		
Michelin Tire Co.	37,260	
L. Littlejohn & Co., Inc.	87,615	
Raw Products Co.	33,461	
The Goodyear Tire & Rubber Co.	201,485	
W. H. Stiles & Co.	13,400	
The Rubber Trading Co.	40,230	
Hagemeyer Trading Co.	102,676	
General Rubber Co.	235,845	
Fred. Stern & Co.	172,395	
Robinson & Co.	8,100	
Various	117,855	1,050,322
FEBRUARY 8.—By the *Mongolia*=London:		
L. Littlejohn & Co.	118,800	
Rubber Trading Co.	22,680	
W. H. Stiles & Co.	112,000	
Michelin Tire Co.	57,645	
Goodyear Tire & Rubber Co.	429,975	
Fred. Stern & Co.	32,400	
Arnold & Zeiss	68,850	
Winter Sons & Co.	16,065	
G. R. Henke	14,985	873,400
FEBRUARY 13.—By the *New York*=Liverpool:		
Various		1,890
FEBRUARY 13.—By the *Feltria*=London:		
Arnold & Zeiss	95,175	
Aldens' Successors, Ltd.	686,000	
Various	537,465	1,318,640
FEBRUARY 13.—By the *Kroonland*=Liverpool:		
Various		2,700
FEBRUARY 13.—By the *Andania*=Liverpool:		
United States Rubber Co.	13,770	
Various	12,285	26,055
FEBRUARY 13.—By the *Ascania*=London:		
J. T. Johnstone Co.	47,790	
W. R. Grace & Co.	47,115	
Various	294,110	389,015
FEBRUARY 13.—By the *Valeria*=Liverpool:		
The B. F. Goodrich Co.	21,330	
Philadelphia Rubber Works Co.	25,380	
Various	540	47,250
FEBRUARY 14.—By the *Carpathia*=Liverpool:		
Aldens' Successors, Ltd.	223,500	
W. H. Stiles & Co.	30,000	
Various	307,155	560,655
FEBRUARY 14.—By the *Waaldyk*=Sourabaya:		
L. Littlejohn & Co.	40,230	
General Rubber Co.	209,250	
G. Amsinck & Co.	63,990	
Raw Products Co.	47,854	
Hagemeyer Trading Co.	22,068	
Fred. Stern & Co.	2,240	
Various	117,982	503,614
FEBRUARY 14.—By the *Waaldyk*=Batavia:		
G. Amsinck & Co.	12,960	
L. Littlejohn & Co.	29,970	
General Rubber Co.	6,750	
Ned Escompte Co.	1,485	
Stein, Hirsch & Co.	73,845	
W. H. Stiles & Co.	11,200	
Various	923,675	1,059,885
FEBRUARY 15.—By the *Valacia*=London:		
Aldens' Successors, Ltd.	341,200	
L. Littlejohn & Co.	235,440	
The B. F. Goodrich Co.	235,035	
Michelin Tire Co.	88,830	
Charles T. Wilson Co., Inc.	65,610	
J. W. Johnstone & Co.	115,155	
W. R. Grace & Co.	372,600	
Edward Maurer & Co.	40,635	
Meyer & Brown	36,585	
Hagemeyer Trading Co.	17,771	
Leo Ratner	6,615	1,555,476
FEBRUARY 15.—By the *Bassano*=Hull:		
Robinson & Co.	12,015	
Robert Badenhop Co.	21,600	61,020
FEBRUARY 17.—By the *Buffalo*=Hull:		
Firestone Tire & Rubber Co.	28,890	
The Hagemeyer Trading Co.	12,989	
Robinson & Co.	41,715	
Meyer & Brown	27,810	
Robert Badenhop Co., Inc.	70,200	258,525
FEBRUARY 19.—By the *Lancastrian*=London:		
Hagemeyer Trading Co.	39,690	
Raw Products Co.	121,365	
United States Rubber Co.	519,750	
Michelin Tire Co.	65,610	
Robinson & Co.	27,945	
W. H. Stiles & Co.	13,400	
Various	29,800	817,560
FEBRUARY 19.—By the *Crewe Hall*=Colombo:		
W. H. Stiles & Co.	33,600	
Hagemeyer Trading Co.	6,720	
Various	359,685	400,005
FEBRUARY 21.—By the *Orduna*=Liverpool:		
Various		55,080
FEBRUARY 21.—By the *Ansonia*=London:		
Aldens' Successors, Ltd.	336,500	
L. Littlejohn & Co.	219,240	
Michelin Tire Co.	111,240	
Leo Ratner	7,020	
Various	298,890	972,890
FEBRUARY 23.—By the *Philadelphia*=Liverpool:		
Various		1,080

BALATA.

FEBRUARY 2.—By the *Carrillo*=Cartagena:		
G. Amsinck & Co.	4,600	
American Trading Co.	16,790	21,390
FEBRUARY 6.—By the *Tenadores*=Bocas Del Toro:		
Eggers & Heinlein	920	
H. Marquardt & Co.	3,450	
Gontard & Co.	12,650	17,020
FEBRUARY 7.—By the *Colon*=Panama City:		
Gontard & Co.	9,200	
Fidanque Bros. & Sons	25,070	
I. Brandon & Bros.	3,220	
Piza Nephews Co.	460	37,950
FEBRUARY 7.—By the *Colon*=Cristobal:		
Carlos Carbone, Jr.	11,040	
Pottsberg, Ebeling & Co.	7,360	
M. A. de Leon & Co.	3,220	
Gontard & Co.	7,820	29,440
FEBRUARY 7.—By the *Maravel*=Ciudad Bolivar:		
American Trading Co.	11,880	
Yglesias Lobo & Co.	4,680	
G. Williams & Wigmore	15,960	32,520
FEBRUARY 7.—By the *Maravel*=Demerara:		
Various		16,720
FEBRUARY 7.—By the *Maravel*=Paramaribo:		
Middleton & Co.	16,720	
R. Dan Walterbeck	5,720	22,440
FEBRUARY 7.—By the *Maravel*=Trinidad:		
Trinidad Shipping & Trading Co.		37,840
FEBRUARY 15.—By the *Valacia*=London:		
H. A. Astlett & Co.		2,760
FEBRUARY 15.—By the *Advance*=Cristobal:		
Gontard & Co.	4,370	
Mecke & Co.	9,200	13,570
FEBRUARY 15.—By the *Mayaro*=Ciudad Bolivar:		
Gaston, Williams & Wigmore		8,280
FEBRUARY 15.—By the *Mayaro*=Paramaribo:		
R. Dan Walterbeck		460
FEBRUARY 16.—By the *Almirante*=Cartagena:		
American Trading Co.	15,410	
G. Amsinck & Co.	27,830	43,240
FEBRUARY 21.—By the *Panama*=Cristobal:		
Pablo Calvet & Co.	11,730	
G. Amsinck & Co.	7,130	
I. Brandon & Bros.	5,980	
Gontard & Co.	5,060	
Fidanque Bros. & Sons	14,490	
Pottberg, Ebeling & Co.	12,880	
Pan-American Hide Co.	1,150	
M. A. de Leon & Co.	11,500	69,920

PONTIANAK.

FEBRUARY 6.—By the *Pleiades*=Singapore:		
L. Littlejohn & Co.	108,750	
Robinson & Co.	107,250	
W. Brandt's Sons	85,000	
Hagemeyer Trading Co.	112,000	
Various	341,750	754,750
FEBRUARY 14.—By the *Waaldyk*=Batavia:		
E. Everett Carleton	33,600	
Various	57,600	91,200

GUTTA PERCHA.

FEBRUARY 6.—By the *Pleiades*=Singapore:		
W. Brandt's Sons		7,250
FEBRUARY 13.—By the *Tsushima Maru*=Manila:		
Busk & Daniels		5,100

RUBBER SCRAP.

JANUARY 30.—By the *Collingham*=Havre:		
H. Muehlstein & Co.		7,040
FEBRUARY 2.—By the *Penmorvah*=Havre:		
H. Muehlstein & Co.	9,840	
Maison, Lazarus	6,600	16,440
FEBRUARY 2.—By the *Boric*=Manchester:		
Pequanoc Rubber Co.	8,160	
Gutta Percha Rubber Mfg. Co.	4,480	
Rubber Regenerating Co.	6,720	
Manhattan Rubber Co.	160	
H. Muehlstein & Co.	2,400	
United States Rubber Reclaiming Co.	29,600	
Various	2,400	53,920
FEBRUARY 7.—By the *Colon*=Panama City:		
I. Brandon & Bros.		320
FEBRUARY 7.—By the *Saratoga*=Havana:		
H. Muehlstein & Co.	5,440	
Yglesias, Lobo & Co.	17,720	20,160
FEBRUARY 7.—By the *Clare*=Buenos Aires:		
H. Muehlstein & Co.		220,000
FEBRUARY 7.—By the *Mongolia*=London:		
H. Muehlstein & Co.		72,200
FEBRUARY 9.—By the *Metaba*=London:		
H. Muehlstein & Co.	26,720	
Various	29,600	56,320
FEBRUARY 13.—By the *Feltria*=London:		
Various		148,800
FEBRUARY 13.—By the *Ascania*=London:		
Rubber Regenerating Co.	32,000	
Various	34,400	66,400
FEBRUARY 14.—By the *Havana*=Havana:		
Yglesias, Lobo & Co.		5,400
FEBRUARY 15.—By the *Valacia*=London:		
United States Rubber Reclaiming Co.	3,840	
H. Muehlstein & Co.	61,280	
Joseph Chalfin	38,400	
Various	16,640	120,160
FEBRUARY 15.—By the *Mayaro*=Paramaribo:		
American Trading Co.	3,200	
Bees & Co.	160	3,360
FEBRUARY 17.—By the *Honduras*=Havre:		
Muehlstein & Co.	10,080	
Leopold Lazarus Co.	21,920	32,000
FEBRUARY 19.—By the *Tolia*=Avonmouth:		
H. Muehlstein & Co.	37,920	
Joseph Chalfin	116,320	154,240
FEBRUARY 19.—By the *Lancastrian*=London:		
H. Muehlstein & Co.	31,520	
Various	14,240	45,760
FEBRUARY 19.—By the *Frances*=Ceara:		
Various		5,600
FEBRUARY 19.—By the *Monterey*=Vera Cruz:		
Graham, Hinkley & Co.		1,600
FEBRUARY 20.—By the *Tagus*=Colon:		
Various		7,840
FEBRUARY 21.—By the *Saratoga*=Havana:		
Gontard & Co.	9,440	
Yglesias, Lobo & Co.	6,400	15,840
FEBRUARY 21.—By the *Ansonia*=London:		
Trenton Scrap & Rubber Supply Co.	19,040	
H. Muehlstein & Co.	29,120	
Various	12,480	60,640
FEBRUARY 21.—By the *Panama*=Cristobal:		
E. Bers & Co.	4,800	
J. A. del Solar	15,360	20,160

CRUDE RUBBER ARRIVALS AT SEATTLE.

[Consignee is given first. Figured 135 pounds net to the case.]

PLANTATION.

TO SEATTLE.

JANUARY 29.—By the *Protesilaus*=Hongkong:		
W. R. Grace & Co.	37,800	
Goodyear Tire & Rubber Co.	122,445	
Arnold & Zeiss	10,395	170,640
FEBRUARY 6.—By the *Shidzuoka Maru*=Yokohama:		
W. R. Grace & Co.		1,080
FEBRUARY 6.—By the *Princess Adelaide*=Vancouver, B. C.:		
Goodyear Tire & Rubber Co.		9,720
FEBRUARY 19.—By the *Kamakura Maru*=Yokohama:		
Goodyear Tire & Rubber Co.	2,025	
W. R. Grace & Co.	1,890	3,915
FEBRUARY 20.—By the *Chicago Maru*=Yokohama:		
Mitsui Bussan Kaisha		47,925

TO NEW YORK.

JANUARY 29.—By the *Protesilaus*=Hongkong.

	Pounds.	
Arnold & Zeiss	40,500	
United States Rubber Co.	388,665	
East Asiatic Co.	10,395	
Goodyear Tire & Rubber Co.	8,180	
W. R. Grace & Co.	35,775	
J. T. Johnstone Co.	7,695	
Arthur Meyer & Co.	3,240	494,370

FEBRUARY 2.—By the *Mexico Maru*=Yokohama:

Goodyear Tire & Rubber Co.	16,335	
Henderson & Korn	87,750	104,085

FEBRUARY 8.—By the *Hawaii Maru*=Yokohama:

Henderson & Korn	270

FEBRUARY 20.—By the *Chicago Maru*=Yokohama:

Henderson & Korn	82,890

TO AKRON.

JANUARY 29.—By the *Protesilaus*=Hongkong:

Goodyear Tire & Rubber Co.	322,245	
Firestone Tire & Rubber Co.	49,815	
J. T. Johnstone & Co.	155,250	527,310

FEBRUARY 2.—By the *Mexico Maru*=Yokohama:

Goodyear Tire & Rubber Co.	10,530

FEBRUARY 8.—By the *Hawaii Maru*=Yokohama:

Goodyear Tire & Rubber Co.	11,070

FEBRUARY 19.—By the *Kamakura Maru*=Yokohama:

Goodyear Tire & Rubber Co.	112,860

FEBRUARY 20.—By the *Chicago Maru*=Yokohama:

The B. F. Goodrich Co.	481,005

CUSTOM HOUSE STATISTICS.

PORT OF NEW YORK—DECEMBER, 1916.

IMPORTS:	POUNDS.	VALUE.
India rubber	21,707,623	$11,652,201
Balata	328,784	168,675
Gutta percha	132,596	14,836
Gutta jelutong (Pontianak)	457,032	22,259
Manufactures of india rubber	.....	22,163
Totals	22,626,035	$11,880,134
EXPORTS:		
India rubber	11,096	$7,989
Balata	99,385	54,099
Rubber scrap	199,225	24,208
Reclaimed rubber	22,521	3,600
India rubber boots.....*pairs*	43,947	122,734
India rubber shoes.....*pairs*	82,495	41,301
Automobile tires	.....	829,179
Other rubber tires	.....	103,115
Belting, hose, etc.	.....	204,157
All other rubber manufactures	.....	363,507
Total	.....	$1,753,889

PORT OF NEW YORK—JANUARY, 1917.

IMPORTS:		
India rubber	28,740,291	$15,434,943
Balata	310,677	150,864
Gutta percha	240,241	21,071
Gutta jelutong (Pontianak)	2,921,461	127,475
Manufactures of india rubber	.....	28,734
Totals	32,212,670	$15,763,087

EXPORTS:	POUNDS.	VALUE.
India rubber	169,619	$88,684
Balata	118,547	67,767
Rubber scrap	89,958	7,553
Reclaimed rubber	9,273	1,726
India rubber boots.....*pairs*	11,241	28,886
India rubber shoes.....*pairs*	137,391	63,051
Automobile tires	.....	834,295
Other rubber tires	.....	686,762
Belting, hose, etc.	.....	209,280
All other rubber manufactures	.....	505,238
Total	.....	$2,493,242

PORT OF SAN FRANCISCO—DECEMBER, 1916.

IMPORTS:		
India rubber	497,775	$280,052
Rubber scrap	3,005	190
Manufactures of india rubber	.....	266
Totals	500,780	$280,508
EXPORTS:		
India rubber boots.....*pairs*	672	$2,142
India rubber shoes.....*pairs*	12,799	10,080
Automobile tires	.....	$70,468
Other rubber tires	.....	9,540
Belting, hose, etc.	.....	22,266
All other rubber manufactures	.....	13,110
Total	.....	$127,606

RUBBER STATISTICS FOR THE UNITED STATES.

IMPORTS OF CRUDE AND MANUFACTURED RUBBER.

UNMANUFACTURED—*free:*	1915. Pounds.	1915. Value.	1916. Pounds.	1916. Value.
India rubber:				
From—				
France	290,446	$134,073	652,206	$362,372
Germany	6,987	843	.....	.....
Portugal	4,351,835	1,539,939	1,273,530	563,833
United Kingdom	87,244,979	47,566,344	58,157,721	39,414,267
Central America and British Honduras	1,243,476	549,101	1,249,656	573,046
Mexico	1,761,911	660,648	2,545,095	1,053,054
Brazil	51,473,477	21,422,230	49,281,838	24,589,208
Other South America	5,949,524	2,519,091	5,515,102	2,616,518
East Indies	63,940,104	33,712,497	140,832,273	90,155,040
Other countries	5,219,182	2,926,378	582,784	418,137
Totals	221,481,921	$111,031,144	270,090,205	$159,745,475
Balata	2,302,684	864,694	2,748,207	1,265,896
Guayule gum	4,966,464	1,445,453	2,537,167	693,251
*Gutta jelutong	21,230,028	979,786	24,792,820	1,236,502
Gutta percha	2,231,246	258,948	3,176,010	349,727
Totals	252,212,343	$114,580,025	303,344,409	$163,290,851
Rubber scrap	12,342,117	877,026	16,084,653	1,226,157
Totals, unmanufactured	264,554,460	$115,457,051	319,429,062	$164,517,008
Chicle .....*dutiable*	7,916,893	$2,903,918	7,250,336	$3,198,153
MANUFACTURED—*dutiable:*				
Gutta percha	.....	$6,266	.....	$180,006
India rubber	.....	445,255	.....	486,333
Totals, manufactured	.....	$451,521	.....	$666,339
Substitutes—elasticon, etc.	.....	19,334	.....	18,662

EXPORTS OF DOMESTIC MERCHANDISE.

MANUFACTURED—	1915. Pounds.	1915. Value.	1916. Pounds.	1916. Value.
Automobile tires:				
To—				
†Russia in Europe	.....	.....	.....	$944,261
England	.....	$6,698,584	.....	5,682,305
Canada	.....	1,185,930	.....	897,212
Mexico	.....	152,578	.....	227,981
Cuba	.....	356,903	.....	805,471
Australia	.....	563,639	.....	1,675,343
New Zealand	.....	.....	.....	982,154
Philippine Islands	.....	292,735	.....	434,551
Other countries	.....	2,168,283	.....	3,562,665
Totals	.....	$11,418,652	.....	$15,211,943
All other tires	.....	1,993,262	.....	2,517,065
Belting hose and packing	.....	2,002,847	.....	3,530,219
Rubber boots.....*pairs*	548,706	1,229,155	660,169	1,593,046
Rubber shoes.....*pairs*	2,098,327	1,478,513	3,002,842	1,486,705
Scrap and old rubber	3,123,395	356,820	3,418,884	392,977
Reclaimed rubber	6,196,424	830,917	5,390,695	807,777
Other rubber manufactures	.....	5,102,726	.....	8,394,616
Totals, manufactured	.....	$24,412,892	.....	$33,934,348
Fountain pens...*number*	200,637	$205,225	251,662	$147,587

EXPORTS OF FOREIGN MERCHANDISE.

UNMANUFACTURED—	1915. Pounds.	1915. Value.	1916. Pounds.	1916. Value.
Balata	784,360	$307,479	922,301	$389,288
Guayule gum	47,391	16,701	.....	.....
Gutta jelutong	2,773	305	56,000	2,520
Gutta percha	63,637	12,466	2,383	2,095
India rubber	4,664,095	2,357,350	9,179,017	5,330,100
Rubber scrap and refuse	12,687	1,107	.....	.....
Totals, unmanufactured	5,574,943	$2,695,408	10,159,701	$5,724,003
Chicle	463,589	$156,285	489,029	$168,356

EXPORTS OF RUBBER GOODS TO NON-CONTIGUOUS TERRITORIES OF THE UNITED STATES.

MANUFACTURED—	1915. Quantity.	1915. Value.	1916. Quantity.	1916. Value.
To—				
Alaska:				
Belting, hose and packing	.....	$123,745	.....	$120,719
Boots and shoes..*pairs*	65,013	183,347	94,952	227,059
Other rubber goods	.....	26,377	.....	47,556
Totals	65,013	$333,469	94,952	$395,334
To—				
Hawaii:				
Belting, hose and packing	.....	$78,087	.....	$81,998
Automobile tires	.....	447,469	.....	593,777
Other tires	.....	58,368	.....	92,686
Other rubber goods	.....	70,096	.....	130,939
Totals	.....	$654,020	.....	$899,400
To—				
Philippine Islands:				
Belting, hose and packing	.....	$50,765	.....	$65,170
Boots and shoes..*pairs*	37,412	34,489	172,202	122,762
Tires	.....	363,657	.....	496,925
Other rubber goods	.....	151,799	.....	217,170
Totals	37,412	$600,710	.....	$902,027
To—				
Porto Rico:				
Belting, hose and packing	.....	$34,676	.....	$46,723
Automobile tires	.....	313,429	.....	537,296
Other tires	.....	27,326	.....	22,950
Other rubber goods	.....	66,097	.....	98,138
Totals	.....	$441,528	.....	$705,107

* Dutiable beginning July 1, 1916.
† Not separately stated prior to January 1, 1916.

IMPORTS AND EXPORTS OF CRUDE AND MANUFACTURED RUBBER AT THE PORT OF NEW YORK.

IMPORTS.

Week Ending—	India Rubber.		Scrap for Re-manufacture.		Balata.		Gutta Percha.		Gutta Jelutong.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
January 19, 1917	.....	$4,311*	.....	.....	.....	.....	.....	.....	.....	.....
	8,088,642	4,518,081	668,087	$49,823	137,959	$68,310	200,303	$16,854	.....	.....
January 26, 1917	.....	2,324*	.....	.....	.....	.....	.....	.....	.....	.....
	5,814,891	3,214,092	255,895	17,482	33,949	14,585	.....	.....	.....	.....
February 2, 1917	.....	1,597*	.....	.....	.....	.....	.....	.....	.....	.....
	6,758,017	3,266,174	353,401	25,689	35,874	14,606	22,188	2,651	254,996	$10,337
February 9, 1917	.....	3,609*	.....	.....	.....	.....	.....	.....	.....	.....
	1,299,817	668,842	151,155	9,360	69,760	29,450	.....	.....	983,353	43,117
February 16, 1917	.....	11,027*	.....	.....	.....	.....	.....	.....	.....	.....
	2,401,650	1,471,813	48,623	6,277	84,608	43,408	6,177	838	90,186	3,919

* Manufactures of India Rubber.

In addition to the above, 2,280 pounds of chicle was imported, valued at $1,140; and substitutes for India Rubber valued at $397.

EXPORTS.

FIGURES ISSUED FROM JANUARY 26 TO FEBRUARY 23, 1917.

EXPORTED TO—	Belting, Hose and Packing.	Footwear.		Tires.		Insulated Wire and Cables.	Other mnf. of India Rubber.	Fountain Pens.	Chewing Gum.	Reclaimed Rubber.	Scrap Rubber.
		Boots.	Shoes.	Auto.	Other.						
NORTH AMERICA:											
Bermuda	$39	.....	$113	.....	.....	$140	$333	$7	$154	.....	.....
British Honduras	117	.....	.....	.....	.....	.....	18	.....	.....	.....	.....
Central American States—											
Costa Rica	120	.....	.....	$161	$150	747	482	.....	229	.....	.....
Guatemala	29	.....	.....	2,295	4	98	1,598	.....	856	.....	.....
Honduras	549	.....	.....	146	7	.....	102	.....	40	.....	.....
Nicaragua	14	.....	162	.....	.....	30	619	.....	.....	.....	.....
Panama	3,643	$485	400	5,458	5,328	4,958	3,080	194	1,626	.....	.....
Salvador	2,846	.....	.....	1,017	1,339	59	1,986	.....	.....	.....	.....
Mexico	13,102	.....	.....	13,629	969	7,982	8,984	66	277	.....	.....
Miquelon	.....	.....	.....	.....	.....	.....	26	.....	.....	.....	.....
Newfoundland	.....	6,267	249	444	73	5,241	1,887	.....	603	.....	.....
West Indies—											
British—											
Barbados	13	25	22	939	.....	.....	23	.....	.....	.....	.....
Jamaica	265	55	31	6,943	3,659	270	406	.....	64	.....	.....
Trinidad and Tobago	375	.....	16	2,002	71	517	376	2	.....	.....	.....
Other British	1,095	.....	37	560	114	135	348	7	12	.....	.....
Cuba	18,301	361	39	42,228	5,574	33,548	25,262	2,987	4,461	.....	.....
Danish	4	.....	.....	103	.....	.....	146	.....	6	.....	.....
Dutch	33	.....	15	1,372	89	293	103	26	.....	.....	.....
French	193	6	.....	2,317	.....	42	202	36	1	.....	.....
Haiti	78	.....	.....	55	73	.....	764	.....	49	.....	.....
Santo Domingo	513	.....	44	3,399	290	1,226	1,292	3	321	.....	.....
Totals, North America	$41,319	$7,199	$1,128	$83,068	$17,740	$55,286	$48,037	$3,328	$8,699	.....	.....
EUROPE:											
Azores Islands	.....	.....	.....	.....	.....	$25	.....	.....	.....	.....	.....
Denmark	$177	$456	$3,797	$4,340	.....	.....	$1,972	.....	.....	.....	.....
France	11,045	180	3,124	105,847	$88,931	230,849	165,707	.....	$1,531	$1,249	.....
Greece	.....	.....	.....	31,000	.....	.....	.....	.....	964	.....	.....
Italy	303	.....	.....	.....	7,046	.....	850	$334	.....	.....	.....
Netherlands	.....	.....	4,056	1,545	.....	19,585	645	.....	.....	.....	.....
Norway	884	.....	1,843	98	.....	11,957	1,592	.....	.....	.....	.....
Portugal	.....	.....	.....	.....	.....	1,801	184	367	50	.....	.....
Spain	170	.....	.....	284	3,793	2,936	2,294	184	.....	.....	.....
Sweden	.....	.....	.....	.....	.....	8,046	.....	.....	.....	.....	.....
Switzerland	.....	.....	496	.....	.....	310	617	.....	.....	.....	.....
United Kingdom—											
England	36,870	321	30,403	153,330	51,155	72,046	161,787	.....	28,880	.....	.....
Scotland	5,198	.....	.....	.....	.....	.....	148	.....	.....	.....	29,313
Totals, Europe	$54,647	$957	$43,719	$296,444	$150,925	$347,555	$335,796	$885	$31,425	$1,249	$29,313
SOUTH AMERICA:											
Argentina	$5,094	.....	$21,366	$35,194	$3,144	$5,727	$12,658	.....	$84	.....	.....
Bolivia	50	.....	.....	84	.....	.....	6	.....	.....	.....	.....
Brazil	4,964	$183	18,184	30,424	596	48,730	13,046	$873	40	.....	.....
Chile	33,885	988	1,039	28,624	.....	9,269	12,017	9	.....	.....	.....
Colombia	2,514	102	412	1,557	260	4,367	2,669	11	.....	.....	.....
Ecuador	307	.....	.....	640	.....	2,068	2,250	.....	36	.....	.....
Guiana—British	.....	.....	353	.....	170	.....	383	.....	1	.....	.....
Dutch	410	.....	168	51	85	.....	3	.....	.....	.....	.....
Peru	1,067	219	.....	4,615	.....	6,770	10,787	80	192	.....	.....
Uruguay	1,706	.....	722	4,509	159	1,611	2,471	.....	.....	.....	.....
Venezuela	3,110	.....	19	5,239	1,302	2,595	4,844	.....	50	.....	.....
Totals, South America	$53,107	$1,492	$42,263	$110,937	$5,716	$81,137	$61,134	$973	$403	.....	.....
ASIA:											
China	$794	.....	.....	.....	.....	$13,842	$1,214	.....	$53	.....	.....
British India	2,238	.....	.....	$2,597	.....	1,594	868	$221	.....	.....	.....
Straits Settlements	.....	.....	$574	2,146	$660	.....	67	.....	.....	.....	.....
Dutch East Indies	5,947	.....	468	10,643	365	16,580	3,355	.....	.....	.....	.....
Hongkong	.....	.....	.....	.....	21	.....	27	.....	100	.....	.....
Japan	.....	.....	.....	.....	.....	13,703	1,697	.....	.....	$408	.....
Korea	5,717	.....	.....	.....	.....	.....	71	.....	.....	.....	.....
Totals, Asia	$14,696	.....	$1,042	$15,386	$1,046	$45,719	$7,299	$221	$153	$408	.....
OCEANIA:											
British—											
Australia and Tasmania	$1,261	.....	$1,302	$1,224	.....	$3,666	$2,798	.....	$3,240	.....	.....
New Zealand	38	$842	276	9,712	.....	1,745	453	.....	.....	.....	.....
Philippine Islands	865	.....	4,196	292	.....	3,358	9,684	.....	3,471	.....	.....
British Oceania	.....	.....	.....	.....	$66	.....	.....	.....	.....	.....	.....
Totals, Oceania	$2,164	$842	$5,774	$11,228	$66	$8,769	$12,935	.....	$6,711	.....	.....
AFRICA:											
British Africa—											
West	.....	.....	.....	$285	.....	.....	$8	.....	.....	.....	.....
South	$20,982	$3,285	.....	34,991	$6,303	$278	1,972	.....	$79	.....	.....
East	.....	.....	.....	2,894	.....	.....	.....	.....	.....	.....	.....
French Africa	.....	.....	.....	65	.....	.....	.....	.....	.....	.....	.....
Madagascar	215	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Portuguese Africa	325	.....	.....	.....	.....	.....	31	.....	.....	.....	.....
Totals, Africa	$21,522	$3,285	.....	$38,235	$6,303	$278	$2,011	.....	$79	.....	.....

In addition to the above the following items were exported during the same period: To England—Balata, $60,582; India Rubber, $87,474; to Japan—Balata, $1,840.

EXPORTS OF INDIA RUBBER FROM MANAOS DURING JANUARY, 1917.

EXPORTERS.	EUROPE. Fine.	Medium.	Coarse.	Caucho.	Totals.	NEW YORK. Fine.	Medium.	Coarse.	Caucho.	Totals.	Grand Totals.
General Rubber Co. of Brazil. *kilos*	221,917	27,510	8,761	51,812	310,000	89,909	22,006	39,424	33,661	185,000	495,000
Tancredo Porto & Co.	111,640	6,080	.....	14,280	132,000	71,645	32,860	47,409	22,086	174,000	306,000
Stowell & Co.	115,252	10,436	399	26,057	152,144	24,490	2,782	24,838	20,772	72,882	225,026
Ohliger & Co.	.....	.....	.....	.....	.....	113,685	7,481	23,466	37,750	182,382	182,382
J. G. Araujo	33,380	1,280	.....	.....	34,660	104,458	10,400	28,019	.....	142,877	177,537
Adelbert H. Alden, Limited.	95,650	1,085	.....	27,338	124,073	.....	1,979	7,877	.....	9,856	133,929
G. Fradelizi	21,120	.....	.....	.....	21,120	.....	.....	.....	.....	.....	21,120
S. A. Armazens Andresen.	.....	.....	.....	.....	.....	17,095	.....	.....	.....	17,095	17,095
Mesquita & Co.	320	126	594	100	1,140	.....	.....	.....	.....	.....	1,140
Levy, Camille & Co.	.....	.....	1,020	30	1,050	.....	.....	.....	.....	.....	1,050
	599,279	46,517	10,774	119,617	776,187	421,282	77,508	171,033	114,269	784,092	1,560,279
In transit, Iquitos	27,547	2,286	13,605	36,714	80,152	13,200	1,631	6,166	16,299	37,296	117,448
Totals	626,826	48,803	24,379	156,331	856,339	434,482	79,139	177,199	130,568	821,388	1,677,727

EXPORTS OF INDIA RUBBER FROM MANAOS DURING 1916.

EXPORTERS.	EUROPE. Fine.	Medium.	Coarse.	Caucho.	Totals.	NEW YORK. Fine.	Medium.	Coarse.	Caucho.	Totals.	Grand Totals.
General Rubber Co. of Brazil. *kilos*	992,033	201,789	60,216	714,746	1,968,774	934,075	164,814	373,414	368,923	1,841,226	3,810,000
Tancredo Porto & Co.	551,069	175,742	45,674	192,613	965,098	841,419	202,228	304,782	167,429	1,515,848	2,480,946
Suter & Co.	292,413	16,984	8,767	371,663	689,827	572,499	50,090	187,115	193,787	1,003,491	1,693,318
Adelbert H. Alden, Limited.	617,753	15,853	9,216	425,412	1,068,234	27,029	87,968	144,937	6,653	266,587	1,334,821
Pralow & Co.	317,521	25,059	62,666	153,782	559,028	365,393	43,187	116,396	91,888	616,864	1,175,892
J. G. Araujo	284,545	21,521	43,653	37,784	387,503	418,254	65,465	147,858	73,096	704,673	1,092,176
S. A. Armazens Andresen.	10,404	461	2,783	91	13,739	420,202	36,123	101,158	177,629	735,112	748,851
Ohliger & Co.	.....	.....	.....	.....	.....	307,612	14,520	43,118	31,092	396,342	396,342
Stowell & Co.	24,501	320	.....	34,993	59,814	200,440	19,152	39,823	56	259,471	319,285
H. Balding	459	228	67	20	774	72,376	.....	.....	29,103	101,479	102,253
Gaspar Almeida & Co.	.....	.....	.....	.....	.....	35,846	4,281	14,250	23,801	78,178	78,178
G. Fradelizi	40,529	11,516	856	10,542	63,443	9,120	.....	2,609	337	12,066	75,509
M. Lobo	.....	.....	.....	.....	.....	22,252	5,085	13,656	32,452	73,445	73,445
Sinfronio & Co.	5,140	2,827	3,065	118	11,150	35,039	6,162	14,940	3,751	59,892	71,042
Amorim Irmãos	36,382	6,279	13,077	4,056	59,794	800	320	3,000	3,750	7,870	67,664
Semper & Co.	7,646	.....	40	.....	7,686	32,082	2,617	18,749	3,025	56,473	64,159
J. Carneiro da Molta.	23,957	3,157	7,754	4,012	38,880	10,386	2,012	2,434	1,682	16,514	55,394
Mendes & Co.	12,819	7,520	1,583	5,146	27,068	20,320	.....	400	100	20,820	47,888
B. Levy & Co.	2,400	160	720	.....	3,280	11,253	2,409	3,636	18,616	35,914	39,194
J. Marques	.....	.....	.....	.....	.....	30,080	1,440	.....	6,600	38,120	38,120
Stowell & Sons.	13,567	1,126	911	18,386	33,990	.....	.....	685	.....	685	34,675
Coutinho & Co.	19,520	.....	.....	.....	19,520	1,160	7,200	4,590	1,920	14,870	34,390
Alfredo Martins Pereira.	.....	.....	.....	.....	.....	10,625	1,170	7,787	10,634	30,216	30,216
Compa. Mattogeo. Bolia., Limited	.....	.....	.....	.....	.....	24,783	.....	3,793	916	29,482	29,482
Mesquita & Co.	2,426	1,029	7,266	2,339	13,060	8,428	1,542	2,249	3,173	15,392	28,452
Manoel Vicent Carioca.	.....	.....	.....	.....	.....	16,150	1,600	4,050	.....	21,800	21,800
Ferreira Oliveira & Co.	.....	.....	.....	.....	.....	.....	.....	.....	17,968	17,968	17,968
Gunzburger & Co.	.....	.....	.....	.....	.....	1,246	92	2,913	12,356	16,607	16,607
Moraes Carneiro & Co.	1,760	480	.....	.....	2,240	4,212	883	6,657	1,790	13,542	15,782
Lima & Irmão.	8,512	2,400	4,530	117	15,559	.....	.....	.....	.....	.....	15,559
E. Strassberger & Co.	.....	.....	.....	.....	.....	435	254	1,032	2,339	4,060	4,060
Sundries (19)	24,273	4,853	16,955	25,387	71,468	32,336	4,599	8,411	5,356	50,702	122,170
	3,289,629	499,304	289,799	2,001,207	6,079,929	4,465,872	725,213	1,574,432	1,290,222	8,055,709	14,135,638
In transit, Iquitos	277,648	27,254	76,106	367,735	748,743	334,875	58,689	132,005	690,253	1,215,882	1,964,565
Totals, 1916	3,567,277	526,548	365,905	2,368,942	6,828,672	4,800,717	783,902	1,706,437	1,980,475	9,271,591	16,100,203
Totals, 1915	4,612,220	609,831	1,784,076	2,110,048	9,116,175	4,976,216	689,083	555,460	1,548,697	7,778,456	16,894,631

(Compiled by Stowell & Co., Manaos.)

EXPORTS OF INDIA RUBBER AND CAUCHO FROM PARA, DURING 1916, AND FOR NINETEEN YEARS.

EXPORTERS.	NEW YORK. Fine.	Medium.	Coarse.	Caucho.	Totals.	EUROPE. Fine.	Medium.	Coarse.	Caucho.	Totals.	Grand Totals.
J. Marques *kilos*	1,778,198	234,834	1,044,343	580,242	3,637,617	605,585	46,727	109,911	301,716	1,063,939	4,701,556
General Rubber Co.	1,047,864	100,473	917,452	423,381	2,489,170	617,372	41,485	17,901	206,124	882,882	3,372,052
Suter & Co. }	663,379	108,549	584,084	242,276	1,598,288	216,263	13,912	7,590	251,258	489,023	2,087,311
Stowell & Co. }	367,054	22,404	116,092	1,497	507,047	225,162	16,595	2,667	97,780	342,204	849,251
Suarez, Hermanos & Co., Limited	1,044,492	1,520	124,272	302,357	1,472,641	60,822	.....	15,186	105,335	181,343	1,653,984
Pires Teixeira & Co.	404,706	42,815	527,078	135,559	1,110,158	206,667	9,576	772	6,400	223,415	1,333,573
Adelbert H. Alden, Limited.	98,343	72,330	142,926	42,246	355,845	567,315	.....	.....	77,207	644,522	1,000,367
G. Fradelizi & Co.	211,411	19,225	169,372	149,671	549,679	107,451	11,983	3,617	528	123,579	673,258
Berringer & Co.	345,237	29,434	78,561	123,662	576,894	.....	.....	.....	.....	.....	576,894
Seligmann & Co.	280,577	567	35,313	194,337	510,794	1,361	.....	1,082	.....	2,443	513,237
Stowell Brothers	.....	2,210	9,240	.....	11,450	146,794	14,892	22,496	73,979	258,161	269,611
Sundries	452,780	36,571	445,835	302,167	1,237,353	206,989	25,375	54,860	230,422	517,646	1,754,999
	6,694,041	670,932	4,194,568	2,497,395	14,056,936	2,961,781	180,545	236,082	1,350,749	4,729,157	18,786,093
From Itacoatiara	30,760	965	18,200	2,805	52,730	28,419	1,731	17,658	14,975	62,783	115,513
From Manáos	4,483,410	724,133	1,580,197	1,294,888	8,082,628	3,288,029	499,292	289,799	2,001,207	6,078,327	14,160,955
From Iquitos	336,400	46,988	124,787	684,400	1,192,575	277,648	27,254	76,106	367,735	748,743	1,941,318
	11,544,611	1,443,018	5,917,752	4,479,488	23,384,869	6,555,877	708,822	619,645	3,734,666	11,619,010	35,003,879
To South America, Pernambuco	193,573	1,046	7,765	.....	202,384	.....	.....	.....	.....	.....	202,384
Totals, 1916	11,738,184	1,444,064	5,925,517	4,479,488	23,587,253	6,555,877	708,822	619,645	3,734,666	11,619,010	35,206,263
1915	10,172,277	1,383,914	6,533,882	4,429,196	22,519,269	10,654,863	1,069,832	1,084,846	2,376,890	15,186,431	37,705,700
1914	9,972,494	1,677,762	5,645,917	4,389,925	21,686,098	9,071,232	1,114,999	1,461,862	4,385,981	16,034,074	37,720,172
1913	7,223,363	1,354,794	5,324,881	3,198,077	17,101,115	11,749,008	1,591,241	2,456,162	6,338,207	22,114,618	39,215,733
1912	9,477,888	2,035,278	6,503,631	3,337,691	21,354,488	12,570,242	1,414,572	2,822,694	5,200,397	22,007,905	43,362,393
1911	7,686,680	1,571,375	5,173,230	1,669,596	16,100,881	11,230,371	1,503,869	2,504,439	4,519,039	19,757,718	35,858,599
1910	7,500,410	1,412,311	4,489,108	1,658,661	15,060,490	11,673,302	1,506,752	3,382,432	6,416,842	22,979,328	38,039,818
1909	9,439,722	1,767,310	5,784,170	2,655,778	19,646,980	9,832,613	1,372,221	2,950,626	5,649,763	19,805,223	39,452,203
1908	8,280,768	1,739,505	5,616,549	1,902,620	17,539,442	10,721,266	1,419,025	2,854,624	5,528,994	20,523,909	38,063,351
1907	8,012,592	1,863,775	5,149,312	1,580,657	16,606,336	10,783,787	1,358,264	3,190,982	5,574,783	20,907,816	37,514,152
1906	7,406,171	1,785,315	5,496,419	1,531,399	16,192,304	9,289,310	1,253,574	3,223,944	4,799,623	18,575,451	34,767,755
1905	7,173,463	1,518,444	4,921,222	1,647,216	15,260,345	10,052,634	1,291,703	2,498,516	4,363,690	18,656,543	33,916,888
1904	8,062,104	1,630,355	5,394,429	1,222,580	16,309,468	7,615,817	993,955	2,503,520	3,221,376	14,334,668	30,644,136
1903	7,248,065	1,621,827	5,029,646	1,133,857	15,033,395	9,156,872	1,167,956	2,659,748	3,076,971	16,061,547	31,094,942
1902	6,588,524	1,614,776	4,523,413	1,133,155	13,859,868	8,522,521	1,514,521	2,595,177	2,057,222	15,689,912	28,549,780
1901	8,027,727	1,926,505	4,271,456	1,325,290	15,550,978	7,939,010	1,556,358	2,605,553	2,638,599	14,739,520	30,290,498
1900	6,557,277	1,199,611	3,783,279	894,500	12,434,667	7,798,537	1,401,390	3,256,969	1,857,100	14,313,996	26,748,663
1899	7,583,405	1,319,349	4,023,710	951,854	13,878,318	6,410,647	1,030,459	2,527,013	1,583,572	11,551,691	25,430,009
1898	5,399,654	868,982	2,759,714	801,915	9,830,265	6,794,541	1,125,688	2,995,801	1,162,712	12,078,742	21,909,007

(Compiled by Stowell & Co., Para)

RUBBER STATISTICS FOR THE DOMINION OF CANADA.

IMPORTS OF CRUDE AND MANUFACTURED RUBBER.

UNMANUFACTURED—*free:*	November, 1916. Pounds.	Value.
Rubber and gutta percha, crude caoutchouc or india rubber:		
From—		
Great Britain	727,344	$401,230
United States	611,833	346,360
Totals	1,339,177	$747,590
Rubber, recovered:		
From—		
United States	406,015	$64,511
Hard rubber in sheets and rods:		
From—		
Great Britain	540	$301
United States	1,185	1,058
Totals	1,725	$1,359
Rubber substitute:		
From—		
United States	84,807	$8,231
Rubber, powdered, and rubber or gutta percha waste:		
From—		
Great Britain	2,340	$122
United States	33,025	2,896
Other countries	730	47
Totals	36,095	$3,065
Rubber thread, not covered:		
From—		
United States	5,218	$7,457
Chicle, crude:		
From—		
United States	124,903	$42,618
British Honduras	243,623	85,766
Mexico	91,739	30,973
Totals	460,265	$159,357

MANUFACTURED—*dutiable:*	November, 1916. General Tariff. Value.	Preferential Tariff. Value.
Boots and shoes:		
From—		
Great Britain	.....	$1,193
United States	$26,428	.....
Totals	$26,428	$1,193
Belting:		
From—		
United States	$3,968	.....
Waterproof clothing:		
From—		
Great Britain	.....	$20,368
United States	$11,511	.....
Other countries	148	.....
Totals	$11,659	$20,368
Hose, lined with rubber:		
From—		
United States	$6,099	.....
Mats and matting:		
From—		
United States	$454	.....
Packing:		
From—		
Great Britain	.....	$399
United States	$6,739	.....
Totals	$6,739	$399
Tires of rubber for all vehicles:		
From—		
Great Britain	$20	$4,943
United States	56,325	.....
France	93	.....
Totals	$56,438	$4,943
Rubber cement and all other manufactures of india rubber and gutta percha, N.O.P.:		
From—		
Great Britain	$192	$7,470
United States	66,149	.....
Other countries	416	.....
Totals	$66,757	$7,470
Hard rubber in tubes:		
From—		
United States	$2,080	.....
Webbing—over one inch wide:		
From—		
Great Britain	$37	$929
United States	29,249	.....
Totals	$29,286	$929

EXPORTS OF DOMESTIC AND FOREIGN RUBBER GOODS.

MANUFACTURED—	November, 1916. Produce of Canada. Value.	Reexports of Foreign Goods. Value.
Belting:		
To—		
United States	$590	.....
Newfoundland	443	.....
Total	$1,033	.....
Hose:		
To—		
Great Britain	$2,223	.....
Newfoundland	1,655	.....
Other countries	7,235	.....
Total	$11,113	.....
Boots and shoes:		
To—		
Great Britain	$264,309	.....
United States	101	.....
Newfoundland	13,152	$116
Australia	11,603	.....
New Zealand	3,832	.....
Other countries	1,318	.....
Totals	$294,315	$116
Clothing:		
To—		
United States	$5	$18
Tires:		
To—		
Great Britain	$50,385	.....
United States	16,876	$2,834
Other countries	4,169	52
Totals	$71,430	$2,886
*Rubber waste:		
To—		
Great Britain	$2,126	.....
United States	16,842	.....
Total	$18,968	.....
All other manufactures, N. O. P.:		
To—		
Great Britain	$18,407	.....
United States	322	$1,033
Newfoundland	253	.....
Other countries	31	.....
Totals	$19,013	$1,033
†Gum chicle:		
To—		
United States	$259,765	.....

*During November 7,620 pounds of rubber waste was exported to Great Britain and 296,800 pounds to the United States.

†During November 441,231 pounds of gum chicle was exported to the United States.

LONDON AND LIVERPOOL RUBBER STATISTICS.

IMPORTS.

UNMANUFACTURED—	December, 1916. London. Pounds.	£ Sterling.	Liverpool. Pounds.	£ Sterling.
Crude rubber:				
From—				
German West Africa	.....	.....	22,300	2,094
France	.....	.....	35,300	1,890
French West Africa	.....	.....	24,500	2,365
Java	1,198,600	168,279	.....	.....
Other Dutch Possessions in Indian Seas	715,900	93,565	.....	.....
Belgian Congo	.....	.....	2,200	187
Liberia	.....	.....	9,600	667
United States	2,400	94	3,800	380
Mexico	3,000	300	.....	.....
Gold Coast	.....	.....	30,100	1,143
Nigeria	.....	.....	67,000	4,745
Cape of Good Hope	26,600	3,990	.....	.....
Zanzibar and Pemba	1,100	116	.....	.....
British East Africa	100	10	.....	.....
Anglo Egyptian Soudan	.....	.....	500	90
British India	344,300	42,877	.....	.....
Straits Settlements	2,340,700	320,106	716,000	95,412
Federated Malay States	4,494,100	584,282	24,900	3,398
Ceylon and Dependencies	2,225,500	294,312	72,000	10,947
British North Borneo	164,600	22,219	.....	.....
New South Wales	14,900	2,235	.....	.....
Fiji Islands	4,800	600	.....	.....
British West Indian Islands	100	12	.....	.....
British Guiana	300	35	.....	.....
Peru	.....	.....	692,400	81,701
Brazil	.....	.....	2,275,700	337,013
Totals	11,537,000	1,533,032	3,876,300	542,032
Waste and reclaimed rubber:				
From—				
United States	57,000	3,496	81,700	3,945
Channel Islands	4,900	49	.....	.....
Egypt	.....	.....	300	10
New Zealand	7,200	45	97,400	1,000
British West Indies	9,000	49	.....	.....
Totals	78,100	3,639	179,700	4,955
Waste and reclaimed rubber manufactures of the United Kingdom:				
To—				
United States	1,051,100	12,234	246,400	7,476
France	29,500	1,177	42,800	1,263
Italy	19,900	233	.....	.....
Spain	.....	.....	6,700	140
Japan	.....	.....	7,300	115
Canada	58,400	838	.....	.....
Totals	1,158,900	14,482	303,200	8,994

REEXPORTS.

Crude rubber:				
To—				
Russia	36,900	4,760	200	32
France	1,071,700	135,258	215,000	27,601
Denmark (including Faroe Islands)	145,400	20,652	.....	.....
Spain	.....	.....	31,800	3,922
Italy	134,400	15,123	101,000	16,507
Japan (including Formosa and leased territories in China)	.....	.....	71,400	11,139
United States	3,733,700	459,994	341,400	28,800
Canada	292,900	38,305	53,800	4,176
Victoria	.....	.....	11,100	1,948
Totals	541,500	674,092	825,700	94,125
Waste and reclaimed rubber:				
To—				
Italy	.....	.....	17,800	532
Totals	.....	.....	17,800	532

UNITED KINGDOM RUBBER STATISTICS FOR 1916.

IMPORTS.

UNMANUFACTURED— Crude rubber: From—	1915. Pounds.	1915. £ Sterling.	1916. Pounds.	1916. £ Sterling.
Dutch East Indies	6,411,900	716,151	12,404,100	1,716,340
French West Africa	1,623,400	146,920	1,366,500	144,153
Gold Coast	631,800	39,757	1,482,500	119,787
Other countries in Africa	6,245,500	537,282	8,629,200	914,134
Peru	1,658,200	178,271	1,890,500	240,708
Brazil	28,639,100	3,240,779	24,018,300	3,223,115
British India	3,288,800	372,313	3,789,800	535,816
Straits Settlements, including Labuan	66,053,200	7,384,830	44,531,100	6,307,609
Federated Malay States	28,880,300	3,340,071	44,649,700	6,181,287
Ceylon and dependencies	28,609,700	3,230,218	22,518,000	3,156,094
Other countries	4,003,700	406,317	3,259,800	437,097
Totals	176,045,600	19,592,911	168,539,500	22,996,140
Waste and reclaimed rubber	4,180,000	97,320	5,108,100	138,115
Gutta percha	8,507,744	669,193	7,480,368	690,025
MANUFACTURED—				
Apparel, waterproofed	.....	5,376	.....	9,518
Boots and shoes..*dozen pairs*	160,462	264,260	250,746	438,196
Insulated wire	.....	96,348	.....	133,728
Submarine cables	.....	3,089	.....	7
Automobile tires and tubes	.....	1,984,563	.....	2,207,210
Motorcycle tires and tubes	.....	105,123	.....	93,173
Cycle tires and tubes	.....	65,154	.....	113,442
Tires not specified	.....	20,617	.....	10,040

EXPORTS.

MANUFACTURED— Apparel waterproofed: To—	1915. Pounds.	1915. £ Sterling.	1916. Pounds.	1916. £ Sterling.
France	.....	44,364	.....	102,794
British South Africa	.....	41,853	.....	41,271
British East Indies	.....	25,675	.....	26,485
Australia	.....	45,411	.....	76,654
New Zealand	.....	30,435	.....	45,131
Canada	.....	88,875	.....	73,589
Other countries	.....	247,031	.....	331,217
Totals	.....	774,489	.....	700,141
Boots and shoes..*dozen pairs*	118,169	138,773	118,532	140,201
Insulated wire	.....	362,983	.....	546,373
Submarine cables	.....	354,782	.....	449,863
Automobile tires and tubes	.....	664,998	.....	1,198,605
Motorcycle tires and tubes	.....	80,489	.....	106,150
Cycle tires and tubes	.....	431,049	.....	604,333
Tires not specified	.....	114,992	.....	232,466
Manufactures not specified	.....	1,060,066	.....	1,636,447

EXPORTS—FOREIGN AND COLONIAL.

UNMANUFACTURED— To—	1915. Pounds.	1915. £ Sterling.	1916. Pounds.	1916. £ Sterling.
Russia	25,906,100	2,858,843	13,611,500	1,860,218
France	15,209,700	1,772,100	21,044,500	2,894,323
United States	83,180,100	9,273,915	57,454,700	8,054,300
Other countries	17,989,500	2,060,638	16,437,500	2,289,694
Totals	142,285,400	15,965,496	108,548,200	15,098,535
Waste and reclaimed rubber	657,900	20,545	561,300	21,584
Gutta percha	987,953	75,576	629,328	68,499
MANUFACTURED—				
Apparel, waterproofed	.....	695	.....	807
Boots and shoes..*dozen pairs*	12,077	17,583	36,883	43,606
Insulated wire	.....	9,059	.....	21,210
Automobile tires and tubes	.....	562,456	.....	908,877
Motorcycle tires and tubes	.....	13,764	.....	15,796
Cycle tires and tubes	.....	23,180	.....	23,916
Tires not specified	.....	6,572	.....	3,248

The average value of a £ Sterling for 1915 and 1916 was $4.745.

THE MARKET FOR RUBBER SCRAP.

Copyright 1917.

NEW YORK.

UNDOUBTEDLY the difficulties surrounding domestic transportation are responsible for the quiet conditions that have characterized the February market. With embargoes placed on all shipments to and from New York and serious car shortage all over the country there was small chance for good business during the past month. Despite the handicap, however, there has been a quiet routine demand and prices are about the same as they were a month ago. Few changes may be noticed.

BOOTS AND SHOES. The trading in this material has been quiet and prices remain unchanged.

AUTO TIRES. Standard white G. & G. tires have received scant attention and prices have eased off considerably. Standard white tires have moved fairly well and show an advance of ½ to 5/8 cent since our last report. The other grades are unchanged.

AUTO PEELINGS. Both No. 1 and No. 2 grades shows an advance of about ½ cent.

INNER TUBES. The tube position has been materially strengthened by the firm position of crude rubber and all grades are quoted from ½ cent to 1 cent higher than a month ago.

BICYCLE TIRES. The movement in this material has been moderate and prices have moved up 1/8 to ¼ cent.

NEW YORK QUOTATIONS FOR CARLOAD LOTS DELIVERED.

FEBRUARY 24, 1917.

Prices subject to change without notice.

	Per Pound.
Boots and shoes	$0.09½@.09¾
Trimmed arctics	.07⅜@.07½
Untrimmed arctics	.06⅛@.06¼
White tires, Goodrich and Goodyear	.07½@.08
Auto tires, standard white	.07¼@.07½
standard mixed	.06¾@.06¾
stripped, unguaranteed	.04¾@.05
Auto peelings, No. 1	.10 @
No. 2	.08¾@.09
Inner tubes, No. 1	.26 @.27
No. 2	.12 @.13
red	.12 @.13
Irony tires	.02⅛@
Bicycle tires	.04⅜@.05⅛
Solid tires	.05¼@.06
White scrap, No. 1	.13½@.14
No. 2	.10 @
Red scrap, No. 1	.10 @.11
No. 2	.08 @
Mixed black scrap, No. 1	.04¼@
No. 2	.04 @
Rubber car springs	.04½@
Horse shoe pads	.04¾@
Matting and packings	.01 @.01⅛
Garden hose	.01¾@.01¾
Air brake hose	.05½@.05¾
Cotton fire hose	.02½@
Large hose	.01⅞@
Hard rubber scrap, No. 1, bright fracture	.26 @
Battery jars (black compound)	.02½@
Insulated wire stripping	.03½@
Rubber heels	.03¾@

THE MARKET FOR COTTON AND OTHER FABRICS.

Copyright 1917.

NEW YORK.

THE announcement of the German submarine blockade was instantly reflected in the market and prices declined. On February 1, spot cotton was quoted 14.75 cents as compared with 17.40 cents on January 29. As time passed with no overt act on the part of Germany the market gained strength and on February 27 middling spot cotton was quoted at 16.55.

EGYPTIAN COTTON. The scarcity of spot stocks and the small receipts during the past month has strengthened the market. Imports for the period December 27, 1916-January 17, 1917 were 9,000 bales as against 12,700 bales a year ago. Prices are firm, Sakellarides being quoted 50 to 55 cents on February 25. The price nominally is 30 cents.

Concerning the 1917 crop, The Alexandria Cotton Co., Limited, reports the following mail advices from Alexandria, dated January 19: "Thanks to the splendid weather we have had during the past week, the first ploughing for planting has been vigorously resumed over the whole country. However, it is too early to express any definite opinion as to the proportion of the varieties which will compose the next crop, but there is a general tendency to sow Sakellarides again over the whole of the Delta with the exception of the north, where the Assil and Nubari varieties seem to be more in favor owing to last year's failure of the Sakellarides variety in the poor lands of that district.

SEA ISLAND COTTON. The threatened abandonment of the Sea Island cotton industry due to the boll-weevil pest has been in a measure dispelled. Undoubtedly there will be a curtailment in the 1917 crop; that may result in a two-thirds crop reduction. In this event prices would doubtless reach abnormal levels. The normal crop is 100,000 bales.

The demand has been active and prices firm during the month. New York spot quotations have varied from 49 to 55 cents, depending on the quantity.

TIRE FABRICS. The demand has actively continued and contract deliveries have been insistently called for. This may be due to shipping delays, the result of car shortage and local embargoes; however, the uncertain position of the raw material would be sufficient reason for anticipatory buying. The level of prices may

be said to be higher than a month ago. Experiments in the substitution of combed Peelers for Sea Island and Egyptian tire fabrics are being made as a relief measure should the long staple supply be curtailed.

MECHANICAL DUCK. The government has come into the market for supplies in large quantities, thereby strengthening the position of all mechanical duck. As a result prices on hose and belting duck are firmer and contracts are being written further ahead.

SHEETINGS, DRILLS AND OSNABURGS. The demand has been good as many buyers have anticipated their requirements. The market has been visibly strengthened by the prospective government business. However, prices have remained unchanged.

RAINCOAT CLOTH. The imported fabrics have apparently not been affected by the blockade as contract deliveries are being promptly made. The domestic mills are reported to be slow in making deliveries in view of the uncertain market conditions that appear to indicate higher prices.

NEW YORK QUOTATIONS.

FEBRUARY 24, 1917.

Prices subject to change without notice.

Airplane and Balloon Fabrics:			
Wamsutta, S. A. I. L. No. 1, 40-inch	*yard*	$0.35	@
No. 4, 38½-inch		.35	@
Wool Stockinettes—52-inch:			
A—14-ounce	*yard*	1.38	@
B—14-ounce		1.65	@
C—14-ounce		1.92	@
Cotton Stockinettes—52-inch:			
D—14-ounce	*yard*	.55 @	.60
E—11½-ounce		.46 @	.55
F—14-ounce		.60 @	.65
G— 8-ounce		.52 @	.55
H—11-ounce		.55 @	.60
I — 9-ounce		.46 @	.50
Colors—white, black, blue, brown.			
Knitabac Stockinette	*lb.*	1.00 @	1.05
Tire Fabrics:			
17¼-ounce Sea Island, combed	*square yard*	1.25 @	1.35
17¼-ounce Egyptian, combed		1.10 @	1.15
17¼-ounce Egyptian, carded		1.07 @	1.12
17¼-ounce Peelers, carded		.70 @	
Sheeting:			
40-inch 2.35-yard	*yard*	.15¾ @	
40-inch 2.50-yard		.14¾ @	
40-inch 2.70-yard		.14 @	
40-inch 2.85-yard		.13 @	
40-inch 3.15-yard		.12¾ @	
Osnaburgs:			
40-inch 2.25-yard	*yard*	.16½ @	
40-inch 2.48-yard		.15 @	
37½-in. 2.42-yard		.15½ @	
Mechanical Ducks:			
Hose	*pound*	.37 @	.38
Belting		.36 @	.37
Carriage Cloth Duck:			
38-inch 2.00-yard enameling duck	*yard*	.20 @	
38-inch 1.74-yard		.22½ @	
72-inch 16.66-ounce		.44½ @	
72-inch 17.21-ounce		.46 @	
Drills:			
38-inch 2.60-yard	*yard*	.19 @	
40-inch 2.47-yard		.15½ @	
52-inch 1.90-yard		.20½ @	
52-inch 1.95-yard		.20 @	
60-inch 1.52-yard		.26¼ @	
Imported Woolen Fabrics Specially Prepared for Rubberizing—Plain and Fancies:			
63-in, 3½ to 7½ ounces	*yard*	.38 @	1.55
36-inch, 2¾ to 5 ounces		.35 @	.85
Imported Plaid Lining (Union and Cotton):			
63-inch, 2 to 4 ounces	*yard*	.35 @	.75
36-inch, 2 to 4 ounces		.25 @	.50
Domestic Worsted Fabrics:			
36-inch, 4½ to 8 ounces	*yard*	.35 @	.65
Domestic Woven Plain Linings (Cotton):			
36-inch, 3¾ to 5 ounces	*yard*	.10 @	.18
Raincoat Cloth (Cotton):			
Bombazine	*yard*	.08 @	.09½
Twills		.12 @	.18
Tweed		.25 @	.35
Tweed, printed		.07½ @	.11
Plaid		.08½ @	.10
Repp		.24 @	.27
Burlaps:			
32—7½-ounce	*100 yards*	6.90 @	
40—7½-ounce		8.25 @	
40—8-ounce		8.35 @	
40—10-ounce		9.25 @	
40—10½-ounce		9.50 @	
45—7½-ounce		9.40 @	
45—8-ounce		9.50 @	
48—10-ounce		11.50 @	

SEA ISLAND CROP MOVEMENT.

FROM AUGUST 1, 1916, TO FEBRUARY 2, 1917.

		Receipts 1916-17	Receipts 1915-16
Stock on hand, August 1, 1916—			
Savannah, 2,401; Charleston, 107	*bales*	2,508	2,382
Received at Savannah (Gross)		38,489	36,280
Received at Charleston		3,153	5,290
Received at Jacksonville		29,367	23,984
Totals		73,517	67,936
Less Exports		*64,927	52,338
Stock February 2, 1917—			
Savannah, 6,864; Charleston, 1,726		8,590	15,598
Crop in sight at all ports to date		*70,775	65,554

EXPORTS.

From—	To Great Britain.	Continent.	Northern Mills.	Southern Mills.	Totals.
Savannah	989	120	28,457	4,460	34,026
Charleston	261	...	1,273	...	1,534
Jacksonville	...	...	29,367	...	29,367
Totals	1,250	120	59,097	4,460	*64,927
1915-16	555	1,060	46,699	4,024	52,338
	Inc. 695	Dec. 940	Inc. 12,398	Inc. 436	Inc. 12,589

*In addition to the exports shown above there has been a heavy movement direct from interior points to Southern mills and to Northern mills via Norfolk. It is impossible to say at present just how much cotton has been moved in this manner, but it is known to be somewhere between 15,000 and 20,000 bales. The latter figure is probably nearer the correct amount.

(Compiled by John Malloch & Co., Savannah, Georgia.)

EGYPTIAN COTTON CROP MOVEMENT.

FROM AUGUST 1, 1916, TO JANUARY 17, 1917.

To—		1916-17.	1915-16.	1914-15.
Liverpool	*bales*	132,074	136,760	80,009
Manchester		87,702	65,948	80,373
Total shipments to Great Britain		219,776	202,708	160,382
To—				
France	12,102	19,399	25,770	18,106
Spain	7,297			
Italy	17,951	26,345	21,706	70,434
Switzerland	8,394			
Russia		19,167	23,309	18,205
Greece		65	50	1,433
Total shipments to Continent		64,976	70,835	108,178
To—				
United States		69,770	107,656	67,480
India	100	6,475	12,585	5,863
Japan	6,375			
Total shipments to all parts		360,997	393,784	341,903
Total crop (interior gross weight) cantars		4,726,518		6,473,726

(Compiled by Davies, Benachi & Co., Liverpool.)

THE MARKET FOR CHEMICALS AND COMPOUNDING INGREDIENTS.

Copyright 1917.

NEW YORK.

THE base metals that are used in the manufacture of rubber chemicals and compounding ingredients have occupied a strong market position during the past month, due wholly to transportation difficulties. On February 20 the copper metal had advanced 2 cents since February 1. Lead shows a gain of 1 cent, spelter has advanced .875 cents and the metal antimony has gained 5 cents during the same period. Aluminum has been dull and unchanged at 57 to 59 cents.

There has been a good general demand for all compounding materials during the past month and prices in some instances have advanced. The recent diplomatic crisis only resulted in tightening the ocean shipping situation. The freight embargoes that have been placed on all domestic shipments and the car shortage have more seriously affected the rubber chemical trade than has the political situation. Supplies from the west and middle west have been held up and contract deliveries from the eastern points greatly impeded. In view of the present adverse situation and the uncertain future it is advisable to anticipate forward requirements.

ANTIMONY SULPHURETS. The metal situation has stiffened

the market on this material, which has been in good demand.

ANILINE OIL. Prices have advanced about 5 cents since our report a month ago.

CARBON BLACK. The demand appears to be fully up to the supply. Prices are firm at figures ruling a month ago.

CHINA CLAY. The domestic material continues at high levels, being quoted at $16 to $25 the ton in carload lots. The nominal price is $8 to $10.

NAPHTHA. Solvent naphtha has advanced about 1 cent a gallon since our last report.

TALC. All imported grades are strong, due to foreign shipping difficulties. The domestic demand is good at unchanged prices.

VERMILION. English vermilion has advanced sharply owing to the embargo on English mercury. California supplies are handicapped by the car shortage and high freight rates.

WHITING. There seems to be no relief from foreign supplies of the raw material and the situation grows more acute. Domestic grinding is making good progress and deliveries from a southern mill were made during the month. The consuming trade is paying $1.10 to $1.15 a hundredweight for gilder's whiting.

ZINC OXIDE. The New York market has been quite firm, the XX brand going at 13 to 14 cents in second hands. Prices were easier in the middle west, due to local supplies. However, later in the month heavy demands were made on New York stocks, resulting in firmer prices on the American grades in second hands.

NEW YORK QUOTATIONS.

FEBRUARY 26, 1917.

Subject to change without notice.

Accelerene	lb	$2.62	@
Acetone (drums)	lb.	.23	@
Acid, acetic, 28 per cent. (bbls.)	lb.	.03½	@ .04½
cresylic (crude)	gal.	.75	@ .80
glacial, 99 per cent (carboys)	lb.	.25	@ .26
muriatic, 20 degrees	lb.	.01¾	@ .02
nitric, 36 degrees	lb.	.04½	@
sulphuric, 66 degrees	lb.	.01½	@
Alumina, To-six-o (carloads)	ton	19.00	@
Aluminum Flake (carloads)	ton	22.00	@
Ammonium carbonate	lb.	.10	@ .10½
Antimony, crimson, sulphuret of (casks)	lb.	.50	@ .60
crimson, "Magmetco"	lb.	Nominal	
crimson, "Mephisto" (casks)	lb.	.48	@
golden, sulphuret of (casks)	lb.	.25	@ .30
golden, "Magmetco"	lb.	Nominal	
golden, "Mephisto"	lb.	.27	@
golden, sulphuret, States brand, 16-17 per cent.	lb.	.28	@
red sulphuret, States brand	lb.	.25	@
Asbestine	ton	15.00	@17.00
Asbestos	ton	20.00	@40.00
Asphaltum "G" Brilliant	lb.	.03½	@
Barium sulphate, precipitated	lb.	.05	@
Barytes, pure white	ton	30.50	@32.00
off color	ton	15.00	@22.00
Basofor	ton	105.00	@
Benzol, pure	gal.	.55	@ .60
Beta-Naphthol (f. o. b. New York)	lb.	.92	@ .95
Brown, sienna, raw powdered	lb.	.04	@ .06
umber, raw powdered	lb.	.03	@ .03½
Bone ash	lb.	None	
black	lb.	.04	@ .08
Cadmium tri-sulphate (f. o. b. London)	lb	Nominal	
sulphide, yellow	lb.	2.25	@
Cantella gum	lb.	.33	@
Carbon, bisulphide (drums)	lb.	.05	@
black (cases)	lb.	.27	@
tetrachloride (drums)	lb.	.18	@
Caustic soda, 76 per cent.	lb.	.04½	@
Chalk, precipitated, extra light	lb.	.04½	@ .05½
precipitated, heavy	lb.	.03¼	@ .05
China clay, domestic (powdered)	ton	25.00	@
imported (powdered)	ton	65.00	@
Chrome, green	lb.	.40	@
yellow	lb.	.24	@
Cotton linters	lb.	Nominal	
Excellerex		.85	@ .90
Fossil flour	lb.	.04	@ .10
Gas black	lb.	.14	@ .20
Gilsonite	ton	40.00	@
Glue, high grade	lb.	.50	@ .60
medium	lb.	.22	@ .23
low grade	lb.	.17	@ .27
Glycerine, C. P. (drums)	lb.	.54½	@ .55
Graphite, flake (400 pound bbl.)	lb.	.25	@
powdered (400 pound bbl.)	lb.	.08	@
Green oxide of chromium (casks)	lb.	.75	@ .85
Ground glass (fine)	lb.	.02¼	@
Hexamethylenamine	lb.	.60	@ .65
Indian red, reduced grades	lb.	.06	@ .07
pure	lb.	.08	@ .09
Infusorial earth, powdered	ton	60.00	@
bolted	ton	70.00	@
Iron oxide, red, reduced grades	lb.	.02¾	@ .03½
red, pure, bright	lb.	.11	@ .13
Ivory, black	lb.	.18	@ .30
Lampblack	lb.	.12	@ .13
Lead, red oxide of	lb.	.10¼	@
sublimed blue	lb.	.08½	@
sublimed white	lb.	.08½	@
white, basic carbonate	lb.	.08¾	@ .09¼
white, basic sulphate	lb.	.08½	@
black hyposulphite (Black Hypo)	lb.	.45	@ .75
Lime, flour	lb.	.01¾	@ .01½
Litharge	lb.	.09¾	@
English	lb.	.12	@
sublimed	lb.	.09¾	@
Lithopone, imported	lb.	Nominal	
domestic	lb.	.06	@ .06½
Beckton white (carloads)	lb.	Nominal	
Magnesia, carbonate	lb.	.12	@ .15
calcined, heavy	lb.	.09	@ .11
heavy, Thistle Brand	lb.	.12	@
light	lb.	.50	@
Magnesite, calcined, powdered	ton	35.00	@39.00
Mica, powdered	lb.	.03¾	@ .05
Mineral rubber	lb.	.01	@ .02
"M. R. X."	ton	100.00	@
"Genasco" (carloads)	ton	37.00	@
"Richmond Brand"	lb.	.03	@
"No. 64 Brand"	ton	40.00	@
"Refined Elaterite"	lb.	.05	@
"Rubrax"	ton	32.50	@
Naphtha, stove gasolene (steel bbls.)	gal.	.23	@
66@68 degrees (steel bbls.)	gal.	.27	@
68@70 degrees (steel bbls.)	gal.	.28	@
V. M. & P. (steel bbls.)	gal.	.21	@
Oil, aniline	lb.	.26	@ .28
corn, refined (Argo)	cwt.	12.76	@
linseed (bbl.)	gal.	.93	@
palm	gal.	.12	@ .12½
paraffin	gal.	.17	@
pine (cases)	gal.	.65	@
rapeseed, blown	gal.	1.15	@ 1.17
rosin, heavy body	gal.	6.75	@
tar (cases)	gal.	.22	@
soluble aniline colors, yellow, orange, red, violet, blue, green	lb.	5.00	@15.00
Orange mineral, domestic	lb.	.12½	@
Paragol (carloads)	cwt.	10.54	@
Petrolatum	lb.	.06¼	@
Petroleum grease	lb.	.04	@
Pine solvent		None	
Pine tar	bbl.	8.50	@
Pitch, burgundy	lb.	.03¾	@ .04
coal tar	bbl.	4.50	@
pine tar	bbl.	9.35	@
Plaster of paris	lb.	1.50	@ 1.70
Prussian blue	lb.	.80	@
Pumice stone, powdered (bbls)	lb.	.03	@ .04
Resin, Pontianak, refined	lb.	None	
granulated	lb.	None	
fused	lb.	None	
Rosin (500 pound bbls.), @ 280 lbs.	bbl.	6.50	@ 8.50
Rotten stone, powdered	lb.	.02½	@ .04
Rubber black	lb.	Nominal	
Rubber substitute, black	lb.	.09	@ .12½
white	lb.	.13½	@ .18
brown	lb.	.12½	@ .18
Rubhide		.35	@ .40
Shellac, fine orange	lb.	.48	@ .55
Silex (silica)	ton	25.00	@35.00
Soapstone, powdered	ton	14.00	@20.00
Starch, corn, powdered	lb.	.04	@ .04½
Sulphur chloride (drums)	lb.	.09¾	@
Sulphur, flour, velvet, brand (carloads)	cwt.	2.20	@
Bergenport, pure soft brand	cwt.	2.20	@
Talc, American	ton	14.00	@18.00
French	ton	24.00	@28.00
Toluol, pure	gal.	1.75	@ 2.00
Tripolite earth, powdered	ton	60.00	@
bolted	ton	65.00	@
Turpentine, pure gum spirits	gal.	.52	@
wood	gal.	.50	@
Venice	gal.	.11	@ .12
Ultramarine blue	lb.	.20	@ .40
Vermilion, brilliant	lb.	.20	@ .25
Chinese	lb.	.95	@ 1.00
English	lb.	1.50	@ 1.60
Wax, beeswax, white	lb.	.55	@ .60
ceresin, white	lb.	.18	@ .22
carnauba	lb.	.35	@ .55
ozokerite, black	lb.	.55	@ .60
green	lb.	.70	@ .75
montan	lb.	.30	@
paraffin, refined 118/120 m. p. (cases)	lb.	.07	@ .07½
123/125 m. p. (cases)	lb.	.07¾	@ .08
128/130 m. p. (cases)	lb.	.08½	@ .09
133/136 m. p. (cases)	lb.	.09½	@ .10
crude, white, 117/119 m. p. (bbls.)	lb.	.06½	@ .06¾
yellow, 124/126 m. p. (bbls.)	lb.	.06¾	@ .07
Whiting, Alba	cwt.	1.00	@ 1.25
commercial	cwt.	1.00	@
gilders	cwt.	1.10	@
Paris, white, American	cwt.	1.25	@
English cliffstone	cwt.	1.50	@
Wood pulp XXX (carloads)	ton	Nominal	
Yellow ochre (Satin)	lb.	.02¾	@
india rubber	lb.		
Zinc oxide, American process, horsehead brand		Nominal	
"special" f. o. b. factory	lb.	.10	@
"XX red" f. o. b. factory	lb.	.10	@
French process, green seal f. o. b. factory	lb.	.10	@
red seal f. o. b. factory	lb.	.10	@
white seal f. o. b. factory	lb.	.18½	@
Zinc substitutes	ton	25.00	@
Zinc sulphide, pure	lb.	.07	@

INDIA RUBBER WORLD
FOUNDED 1889

Vol. 55 MARCH 1, 1917 No. 6

TABLE OF CONTENTS.